University of Alberta

Increasing Intrinsic Motivation Using Rewards: The Role of the Social Context

by

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A thesis submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Department of Psychology

Edmonton, Alberta
Fall 2007

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395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence
ISBN: 978-0-494-32914-6
Our file Notre référence
ISBN: 978-0-494-32914-6

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Abstract

Two experiments examined the effects of social context and reward on intrinsic motivation. In experiment 1, undergraduate university students worked on a find-the-difference task in either an autonomy-supportive or coercively-controlled context. The autonomy-supportive context was designed to induce feelings of freedom and perceptions of behavior as self-determined by offering choice, limiting surveillance and removing explicit time deadlines. The coercively-controlled context was designed to induce low feelings of autonomy and perceptions of external control by using high surveillance, explicit time deadlines, and repeated directives from an authority. Half the participants received rewards for doing puzzles, half did not receive rewards. Next, participants were given a free-choice period in which they could work on the task or do an alternative activity. The time participants spent on the task, task interest, and time on alternative behavior were the measures of intrinsic motivation. Participants were also assessed on autonomy, competence, and agency (self-determination and performance attributions). The procedure and measures for Experiment 2 were identical to Experiment 1 with the addition of a third reward condition, reward for meeting a specified level of performance.

The results across the two experiments demonstrated that participants rewarded for solving puzzles in a context that emphasized freedom increase free-choice intrinsic motivation for the target activity compared with non-rewarded participants. Rewarded participants also perceived their behavior as more self-determined than non-rewarded. Furthermore, participants who worked in the autonomy-supportive context report greater feelings of autonomy and competence compared to participants who worked in a setting that signaled coercive control. Unfortunately, one problem with the results is that the

findings from Experiment 1 for the engagement contingent reward condition were not replicated in Experiment 2. Generally, however, reward contingencies embedded in a context emphasizing choice, self-initiation, low surveillance, and no deadlines enhance intrinsic motivation as well as feelings of autonomy, competence and self-determination.

Dedication

This thesis is dedicated to Dr. W. David Pierce. In my second year as an undergraduate, David observed something in my behavior that signaled to him that I was worth investing an enormous amount of his wisdom, effort, time, energy and expertise. When completion of my PhD seemed dire, David rose to the occasion, assuming the responsibility of supervisor and within one year, guided me in the development of my research proposal. As well, we met weekly to discuss readings and he recommended I write summaries of the material in order for me to pass the oral candidacy exam. After taking a full-time out of province job, work on the writing of my thesis waned. Once again, David encouraged, edited, motivated and reinforced me to work until its completion. I successfully defended my PhD May 4, 2007. From the bottom of my heart, "thank you, David".

Acknowledgements

Many people deserve appreciation for the completed thesis. First, I offer much gratitude to Dr. C. Donald Heth for the co-supervision of my degree and taking care of myriad of paperwork involved therein and defending my work progress at the annual graduate student evaluation meeting. I owe much appreciation to Dr. Judy Cameron and Dr. W. David Pierce, for providing the guidance, funding and subject matter for the thesis. Thanks to Dr. Connie K. Varnhagen for her participation on my committee and for offering her suggestions for improvements to the designs of the experiments. I wish to express gratitude to Dr. Stephen R. Flora for his insightful questions and presence during the defense, and for contributing to a great celebration afterward. I also would like to express my sincere thanks for fellow graduate student, Shane Lynch, who assisted in both studies as an experimenter.

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Chapter 1

Introduction

Freedom and opposition to coercion, oppression, and domination are values central to Western cultures. Our socialization establishes the concept of freedom and teaches us about coercive control. Based on cultural ideals and social conditioning, it follows that signs of freedom become motivators that people work for and uphold while signs of coercion are conditioned as de-motivators that people escape or avoid. The purpose of the present research is to examine how different social contexts involving freedom or coercion impact people's intrinsic motivation for activities regulated by reward contingencies.

The present research draws on two theoretical perspectives – self-determination theory (SDT) and behavioral theory. According to SDT (Deci & Ryan, 2000), people have basic needs for autonomy (the experience of choice), competence (the desire to be effective and master the environment) and relatedness (the experience of belonging); when these needs are met, people perceive their behavior as self-determined (originating from within) which enhances a person's well-being. Cognitive evaluation theory (CET) was presented as a sub-theory within SDT to specify the conditions that elicit and sustain, versus subdue and diminish intrinsic motivation. Intrinsically motivated behaviors are those that people freely choose to engage in (self-determining) without experiencing feelings of pressure to act, think, or behave in particular ways (autonomously). Intrinsic motivation is based on one's interest in an activity and maintained through satisfaction of the innate needs for self-determination and competence (Deci & Ryan, 2000).

Deci and Ryan (1987) suggested that the social context of behavior affects people's intrinsic motivation. Social contexts that are autonomy-supportive (provide choice and self-initiation) allow for perceptions of self-determination and maintain people's intrinsic motivation in activities. In contrast, coercive and restrictive contexts (time deadlines, evaluations, rewards for performing tasks, and surveillance) reduce self-determination and feelings of autonomy—destroying intrinsic motivation. From the CET viewpoint, rewards are part of a controlling context; thus, rewards lead to weak feelings of autonomy, low perceptions of self-determination and low intrinsic motivation.

In contrast to CET, a behavioral perspective indicates that rewards are neither good nor bad. Rewards and contingencies of reinforcement can be arranged to establish and maintain behavior in social contexts that can be experienced as free and self-determining. In other words, the effects of rewards are determined by the context in which they are administered (Skinner, 197, p. 16).

Both cognitive and behavioral perspectives have addressed freedom and control by a consideration of reward and reinforcement contingencies for performance and intrinsic motivation. The difference between the theories lies in the philosophical underpinnings. CET holds that self-determination and competence are inherent human drives, whereas behaviorism sees freedom as a value that is socialized through the cultural standards of Western society (Skinner, 1971, p. 28). Further, CET posits that rewards are experienced by the receiver as either controlling or informational. When rewards are perceived as controlling, they are thought to cause negative changes in one's feelings of autonomy and perceptions of self-determination thereby destroying a person's intrinsic motivation. However, when rewards provide information about one's

competency, the assessment information can override the inevitable negative impact of the reward. The result is no net loss of intrinsic interest.

From a behavioral perspective, rewards, like other behavioral consequences impact peoples' behavior; individuals learn the contingent relationships between actions and consequences. All rewards for human behavior occur in social contexts and these contexts have motivational effects on the rewarded behavior as well as on the rewards themselves. That is, the effectiveness of rewards in regulating behavior depends on the context rather than on an innate drive. Importantly, from a behavioral perspective, the motivational effects of social contexts are themselves dependent on an extensive history of conditioning and learning.

Based on a consideration of both approaches, the present research examines the effects of rewards for performance when the reward contingencies are arranged in autonomy-supportive versus coercively-controlled social contexts. Two studies were conducted to investigate the relationship between rewards, social context, and intrinsic motivation. Experiment 1 examined the effects of rewards on intrinsic motivation when the rewards were offered in an autonomy-supportive versus a coercively-controlled context. The autonomy-supportive context was designed to generate feelings of freedom and perceptions of self-determination. Autonomy support involved manipulations of self-initiation by offering a choice to engage in the puzzle solving task, low surveillance by an authority, and the absence of time deadlines. In contrast, the coercively-controlled context involved the joint effects of high surveillance, explicit time deadlines, and repeated directives from an authority. These manipulations were designed to induce low feelings of autonomy and perceptions of external regulation. As well, half the participants

assigned to each context (autonomy-supportive vs. coercively-controlled) were offered and given $10.00 for working on the FTD puzzles (reward for doing task or engagement contingent); the other half were not offered a reward (no reward). Experiment 2 replicated the first study with the inclusion of a third level of reward, reward for meeting a performance standard.

Rewards and Intrinsic Motivation: An Overview

Intrinsic motivation is a concept first used in experimental studies of behavior to refer to the tendency of animals to engage in exploratory behavior in the absence of programmed reward or reinforcement (White, 1959). In humans, the first published studies to consider the effect of rewards on peoples' intrinsic motivation were conducted by Edward Deci (1971). According to Deci, intrinsic motivation in humans is based on the presumed innate needs for autonomy and competence; when people are intrinsically motivated, they experience interest and enjoyment of an activity, they feel competent and self-determined, and they perceive the locus of causality for their behavior to be internal (Deci & Ryan, 2000). From this conceptualization, people are said to be intrinsically motivated when they receive no apparent rewards except the enjoyment of the activity itself (Deci, 1971).

To investigate the effects of rewards on intrinsic motivation, the typical experiment uses a between groups design (Deci, 1971). Participants work on interesting activities such as assembling puzzles, finding hidden figures embedded within another picture, or drawing pictures. An offer of reward is made to those in the reward condition; no offer is made to those in the no reward control group. In some studies, rewards are offered for simply working on the experimental task; in other studies, participants must

meet a specified performance criterion in order to receive the reward. Participants in both the reward and no reward groups work on the experimental task. Following this phase, participants offered rewards are given money, prizes, or other tangible items.

To obtain a behavioral measure of intrinsic motivation, the experimenter creates an opportunity for participants to choose to do the experimental activity—usually by making an excuse to leave the experimental room (e.g. "to get a questionnaire for you to complete") for a short time period, usually 5-10 minutes. Participants are asked to remain in the room until the experimenter returns and are told that they may a) continue working on the experimental task, b) work on another activity (e.g. read magazines, do other available puzzles), or c) do nothing but wait. This phase of the experiment is known as the free-choice period. During this time, participants are unaware that they are being observed. The time they spend on the target task is used as one of the primary measures of intrinsic motivation, referred to as the free-time measure. Other measures include task performance (number of correct puzzle solutions during the free-choice period) and participant's questionnaire ratings of task interest. Since the early 1970's over 150 experiments have been conducted (using the basic paradigm described above) to examine the effects of rewards on people's intrinsic motivation.

Meta-analytic Reviews of Research on Rewards and Intrinsic Motivation

Several meta-analytic reviews of the experimental studies on rewards and intrinsic motivation have shown that rewards produce positive, negative, or no effects on intrinsic motivation; the effects of rewards depend on the type of reward presented and the reward contingency (Cameron & Pierce, 1994; 1996; Cameron, Banko, & Pierce, 2001; Deci, Koestner, & Ryan, 1999a; Eisenberger & Cameron, 1996; Eisenberger, Pierce, &

Cameron, 1999). Specifically, the results of meta-analyses show that tangible rewards offered for merely doing an activity, without regard to a performance criterion or standard, reliably decrease the time participants spend on the activity in a free-choice phase; as well, ratings of task interest are found to decrease. In contrast, verbal praise and tangible rewards offered and given for meeting a performance criterion increase measures of intrinsic motivation. Meta-analyses have focused on types of rewards (e.g., tangible and verbal), reward expectancies (expected and unexpected), and reward contingencies (e.g., rewards offered for doing a task or for meeting a performance standard); the focus has not been on the context in which the rewards were administered. Importantly, reward effects may depend on the context in which the participants work for the rewards.

Self-determination Theory: Rewards, Self-determination and Autonomy

Self-determination theory (SDT) is a macro-theory of human motivation concerned with human development and functioning within social contexts (Deci, 1975). The focus of the theory is on volitional behavior that is engaged in with the experience of a perceived internal locus of causality. When people engage in behavior that is self-determined, they act out of choice rather than coercion. SDT consists of four mini-theories, one of which is cognitive evaluation theory (CET) that seeks to explain the effects of social contexts on intrinsic motivation. That is, CET is concerned with events (e.g., receipt of reward; interpersonal context, deadlines, etc.) that facilitate or undermine people's intrinsic motivation.

CET focuses on the innate human needs for competency and autonomy. The theory posits that intrinsic motivation can be enhanced when people feel competent and autonomous and perceive their behavior as self-initiated. From this view, autonomy is the

experience of the lack of pressure to act, think, or feel in particular ways that causes people to perceive themselves as initiators of their own actions--in other words, self-determined.

Conceptions of Self-determination

At the theoretical level, ideas about self-determination are based on the conceptual work of deCharms (1968) who introduced the concepts of internal and external locus of control to describe attributions of intrinsic and extrinsic motivation. Deci incorporated these concepts into CET and proposed that self-determination concerns the degree to which people experience their behavior as volitional and freely chosen, rather than forced by desired outcomes (Deci, Koestner, & Ryan, 1999b). In other words, when rewards are offered (or external constraints are imposed) people do not feel free to do what they want and they perceive their behavior as externally motivated. That is, rewards are said to shift the locus of causality from internal (self) to external sources (offered rewards). The shift in locus of causality is the clearest theoretical definition of self-determination (Deci, 1975, p. 62). In this regard, three experiments have examined the impact of rewards on intrinsic motivation when self-determination (locus of causality) was either measured or manipulated.

Research on Rewards, Self-determination, and Intrinsic Motivation

An experiment by Brockner and Vasta (1981) investigated whether a measure of locus of causality mediated the effects of rewards on intrinsic motivation. The researchers reported that rewarded participants made fewer internal attributions for their performance than no reward controls. That is, participants in the reward condition rated their performance on the experimental task as less due to internal sources like interest,

enjoyment, and so on than those who were not offered rewards. The rewards for performance, however, did not result in a shift of the locus of causality from internal to external sources as would be predicted by CET. For the measures of intrinsic motivation, rewarded participants reported less interest in the activity than non-rewarded participants; there was no significant effect for the amount of time participants spent on the task during the free-choice period.

Porac and Meindl (1982) manipulated self-determination by having participants complete a questionnaire prior to the free-choice period. The questionnaire was designed to induce individuals to take on an intrinsic or extrinsic orientation about the task. These questionnaires were constructed, after extensive pilot testing, to force an interpretation of the task as either a game performed for its own sake (internal cause) or a boring task performed only to receive an extrinsic reward (external cause). The results showed that participants who received rewards and extrinsic task information spent as much time on the task as those who did not receive a reward. One interpretation of these results is that the questionnaire information failed to produce a shift of locus of causality; however, there was no assessment of locus of causality or self-determination after the questionnaire information as a manipulation check.

In a third study, Pittman, Cooper and Smith (1977) manipulated self-determination by providing participants with false physiological feedback cues, indicating their arousal was either due to interest in the activity (internal cause) or to the offered reward for working on the task (external cause). The results showed that participants without rewards (but provided with intrinsic feedback) initiated more trials on the experimental task during the free-choice period (higher intrinsic motivation) than

those receiving rewards and extrinsic feedback, as well as participants without feedback in the reward condition. However, the no reward-intrinsic feedback participants did not initiate more trials than the reward-no feedback participants. A check on the cue manipulations (internal vs. external feedback) indicated a significant effect on locus of causality, suggesting the effectiveness of the bogus physiological feedback. Participants in the reward-extrinsic feedback condition attributed less arousal to internal sources than reward-no feedback participants, but did not differ in the measure of intrinsic motivation. This finding shows that it is possible to produce a manipulation of perceptions of self-determination.

One complexity of the Pittman et al. (1977) experiment is that the measure of intrinsic motivation (initiation of trials) is atypical. Because of this difficulty, it is not clear that the shift in locus of causality (self-determination) produced a decrease in participants' intrinsic motivation. A second problem concerns the manipulation of self-determination. While the manipulation check indicates that false physiological feedback can change perceptions of self-determination, the changes were not enough to induce a difference in intrinsic motivation between the reward no-feedback and reward extrinsic feedback groups. Moreover, in terms of external validity, it is not clear how providing people with false feedback would relate to the effects of rewards on intrinsic motivation in classroom and work settings. That is, in everyday settings people do not infer self-determination from bogus feedback on arousal; it is more likely that inferences of internal causality are based on distinguishing obvious, as opposed to inconspicuous, control of behavior by contingencies (Bem, 1972). At this point, then, there has been no

straightforward, powerful and externally valid way of manipulating self-determination in an experiment on rewards and intrinsic motivation.

Conceptions and Research on Autonomy, Rewards and Intrinsic Motivation

Recall that according to CET, an essential mediator of the impact of rewards on intrinsic motivation is a person's sense of autonomy. Ryan & Deci (2002, p. 70) state that autonomy refers to a sensation or feeling of freedom people experience when the source of one's actions originate from within the self, rather than feeling a sense of pressure or tension brought on by external contingencies. Since CET specifically links the negative effects of rewards to their controlling aspect, and control is defined in terms of pressure to act, think, or feel in a particular way, researchers have assessed feelings of autonomy in terms of the phenomenological experience of pressure-tension or a lack of perceived freedom of action (Ryan, Mims, & Koestner, 1983).

In other studies not linked to CET, autonomy has been assessed in terms of perceived choice or availability of behavioral options. Thus, Eisenberger, Rhoades, & Cameron (1999) assessed autonomy in terms of participants' evaluations of whether they had a choice of strategies to use while working on a puzzle-solving task. When personal autonomy was measured as perceived choice, the results demonstrated that performance contingent rewards had a significant *positive* effect on perceptions of choice; also, based on causal modeling, perceived choice was a positive mediator of the effect of rewards on intrinsic motivation (Eisenberger et al., 1999). Additionally, Overskied and Svartdal (1996, Experiment 1 and Experiment 2) demonstrated that rewards given for merely working on a task without regard to an explicit performance standard increased feelings of autonomy as measured by perceived choice. These results are seemingly contrary to

predictions of CET and provide evidence that the negative effects of rewards on intrinsic motivation are not mediated by perceived choice. That is, the offer of reward usually leads people to see themselves as having a choice to do or not do what the researcher asks; furthermore, perception of choice mediates a positive effect of reward on intrinsic motivation.

Other researchers in the CET tradition dispute Eisenberger et al. (1999), stating that cognitive evaluation of autonomy does not involve perceived choice or opportunity; rather, a sense of autonomy involves the affective experience of choice (Houlfort, Koestner, Joussemet, Nantel-Vivier, & Lekes, 2002, Experiment 1). Affective experience of choice refers to feelings of freedom of action taken by the self, as well as feelings of constraint, control or coercion by external contingencies. From the CET perspective, therefore, it is useful to distinguish between "affective" autonomy (Ryan et al., 1983) and "decisional" autonomy as considered by Eisenberger et al. (1999). Houlfort et al. (2002, Experiment 1, p. 294) state that it is reductions in feelings of autonomy that mediate the detrimental effects of rewards on intrinsic motivation. In making this claim, Houlfort et al. (2002, Experiment 1) ruled out the evidence on perceived choice or decisional autonomy, taking a strong stand that affective autonomy is the key cognitive mediator of rewards and intrinsic motivation.

Research on Rewards, Social Context, Autonomy and Intrinsic Motivation

Early experiments showed that rewards undermined intrinsic motivation (rewarded participants spent less time on the target activity in a free-choice setting compared to non-rewarded participants). The explanation for the finding was that rewards shifted perceived locus of causality from an intrinsic to and extrinsic orientation (Deci,

1975). However, a closer look at the early research gives rise to an alternative explanation.

In the first study (Deci, 1971), participants received rewards for each puzzle solution over four trials. Participants had three minutes to generate the correct solution (time restriction), if they did not, they would not receive the promised reward (foregone positive reinforcement). A competing explanation for the results is that rewards administered within a coercively-controlled context destroyed intrinsic motivation, not the reward per say. However, in this study the effect of the reward contingency was demonstrated only in a coercively-controlled setting. Since no comparison between contexts was examined (autonomy-supportive vs. coercively-controlled), it is not clear that the loss of intrinsic motivation was due to the reward, the loss of expected reward (not all participants solved all four puzzles within the time limit), or the combination of the reward administered in a coercively-controlled setting.

Given the centrality of feelings of autonomy for CET, it is surprising that only two studies have combined manipulations of reward contingencies and affective autonomy (Ryan et al., 1983; Houlfort et al., 2002, Experiment 1). In the experiment by Ryan, et al. (1983), the researchers manipulated both reward (reward vs. no reward) and reward administration (controlling vs. informational) to investigate how rewards interact with context.

Undergraduates received rewards for working on hidden figure puzzles. Participants in the informational context were offered $3 if they "performed well" whereas those in the controlling context were offered $3 if they "performed well as they

should" or "performed up to our standards". There were also two non-rewarded control groups that received the same instructions without the offer of reward.

For participants in the informational context, feedback following each of three puzzles consisted of statements such as "you did very well on that one" and "you did fairly well on that puzzle". The emphasis in the informational conditions was on the person and how well the person was doing at the task. According to CET, participants in informational conditions were expected to experience feelings of freedom of action and accomplishment (feelings of agency). If this happened, rewards were not expected to negatively impact intrinsic motivation. In contrast, participants in controlling contexts received feedback that added a "should-related phrase" to the statements. An example is "you did very well on that one, *as you should*". It was expected that words like "should" and "perform up to our standards" would serve to create a controlling context, leading the participants to feel pressured or constrained; when combined with rewards for performance, these feelings of pressure would result in a loss of intrinsic motivation.

As expected by CET, the results demonstrated a significant negative main effect of reward on intrinsic motivation when assessed as the amount of time participants worked on the target activity, but not on the questionnaire interest measure. As well, participants in the controlling context showed lower intrinsic motivation (measured as time on task) and felt more pressure-tension than participants in the informational context. That is, participants in the controlling context experienced a reduction in affective autonomy compared to those in the informational context. This suggests that the researchers were successful at inducing changes in feelings of control, constraint or

coercion; however, there were no measures of feelings of freedom of action in this experiment to determine if people perceived their behavior as autonomous.

An interesting finding comes from a comparison of participants who received rewards in each of the contexts. Participants who received informational rewards spent more time on the target activity during the free-choice phase than those who received rewards administered in a controlling manner. Apparently, the interpersonal context within which the incentive was administered altered the effect of the reward. Disappointingly, the researchers did not assess whether the informational context induced differences in perceptions of agency. Other problems are that there was no assessment of the effects of rewards on measures of self-determination, no analysis of rewards on the pressure-tension measure of autonomy, and no assessment of the mediating effect of autonomy on the decrease in intrinsic motivation.

In the other study of affective autonomy, Houlfort et al. (2002, Experiment 1) combined a manipulation of reward (reward vs. no reward) with an autonomy manipulation (controlling vs. informational context). The instructions and feedback were modeled after Ryan et al. (1983). Participants worked on a find-the difference task. Rewards were offered contingent on performance. The results showed that rewarded participants felt more pressure-tension than the no reward group but, in this case, there was no effect of reward on either the free-time or interest measures of intrinsic motivation. These results indicate that rewards negatively impacted feelings of autonomy; the loss of affective autonomy, however, did not produce a negative effect of the reward contingency on intrinsic motivation.

An examination of the literature reveals that experiments that demonstrated increases in intrinsic motivation may have inadvertently set up autonomy-supportive conditions. For example, a study by Pierce, Cameron, Banko, and So (2003) investigated the effects of performance standards (constant vs. progressively demanding) and reward (reward vs. no reward) on measures of intrinsic motivation. Participants assigned to the constant standard were asked to solve three puzzles on each of three trials. Those assigned to the progressive performance standard were instructed to solve one, three, and five puzzles, respectively, over the three trials. Half of the participants in the constant and progressive conditions were offered a reward for solving puzzles and the other half were not. Participants were told that there was no time limit to find correct puzzle solutions and the experimenter moved to an adjoining room, leaving participants alone until they called out that they had solved the required number of puzzles for that trial.

Notice that in this study, the social context is free from the coercive control of time restrictions and is low on forms of surveillance. Results showed that participants who were rewarded for meeting a progressively difficult performance standard spent more time on the task in the free-choice period than those who were rewarded for attaining a constant level of performance, or than those who were not offered a reward. In other words, rewarding individuals for meeting a progressively challenging level of performance in a setting that supported autonomy and self-determination increased their intrinsic motivation. A behavioral approach to freedom, rewards and intrinsic motivation can provide an explanation for the enhancement of intrinsic motivation by rewards in autonomy-supportive contexts.

A Behavioral Approach to Freedom, Rewards and Intrinsic Motivation

Through socialization practices and literature, Western culture teaches what it is to be free, the value and pursuit of freedom, and the feelings associated with free will. Furthermore, Judeo-Christian writings emphasize that people know the difference between right and wrong, are able to act out of their own volition, and feel virtuous when they choose the right path. When peoples' freedoms are taken away or threatened, they react forcefully (Brehm, 1966). Laboratory research has demonstrated that repeated experience with a lack of control results in destructive consequences such as learned helplessness (Seligman, 1975). Part of the experience of freedom is the attribution people make about their behavior. In other words, freedom is the perception of having choice and acting voluntarily. Research has shown that people attribute freedom to activities done in their leisure time whereas work is not perceived as free and willful action (Csikszentmihalyi & Graef, 1980; Morris & Ellis, 1993).

The absence of external controlling factors also plays a role in a person's worth or value to society. We give credit to people when the signs of control are difficult to identify (Skinner, 1971, p. 41). In other words, we are often credited with self-motivation, independence and perseverance when we seem to be acting of our own free will (self-determined). Since these ideals are embraced and rewarded by society, it follows that environments that signal freedom or appear low in external control can become powerful motivators of human behavior.

Cross-cultural Limits on the Value of Freedom

A behavioral view suggests that the value and pursuit of freedom depends on a history of conditioning by Western culture. In fact, cross-cultural studies suggest that

people raised in western society view the self as independent, free from constraints and therefore able to pursue goals they have chosen (Markus & Kitayama, 1991). For these people, individual choice is highly relevant. In contrast, people reared in Eastern cultures tend to view the self as interdependent. People in Asian societies value connections with others and harmony within the social groups to which they belong. To these people social interrelatedness is more important than the pursuit of freedom and individual goals.

Recent studies on culture, choice and intrinsic motivation demonstrated that the perception of making choices enhances intrinsic motivation for Anglo American youngsters more than for Asian children (Iyengar & Lepper, 1999). In that study, Asian American and Anglo American children worked on anagrams. One third of children chose which anagrams they worked on and which colour marker they used, one-third were told by an unfamiliar experimenter which anagrams they had to work on and the marker they must use, and one-third were told that the anagrams they worked on and the coloured markers used were chosen by their mothers. To obtain a measure of intrinsic motivation, a free-choice period was available in which children could do more anagrams, crossword puzzles, or wait for the experimenter. Intrinsic motivation was indexed by the number of seconds in a 6-minute period that children spent on the anagrams. Results showed that Anglo American children spent less time on the puzzles in the free-choice period when choices were made for them by others than when they made their own choices. In contrast, Asian American children spent more time on the puzzles with choices were made for them by their mothers. The findings from this study suggest that the value of making one's own choice (freedom) is associated with the culture in which one is raised.

A Behavioral View of Freedom and the Context of Reward

Behavioral theory emphasizes operant or voluntary behavior, defined as behavior that operates on the environment to produce effects or consequences (Skinner, 1938). Contingencies of reinforcement (environment-behavior dependencies) involve four fundamental parts: motivational events such as deprivation and aversive stimulation that activate the contingency and the three-term contingency of reinforcement involving the discriminative stimulus that sets the occasion for behavior, operant responding, and reinforcing consequences.

Of specific interest is the role played by motivational events. These events regulate behavior by altering the effectiveness (and function) of reinforcers and increasing behavior that has been reinforced in the past (Laraway, Snycerski, Michael, & Poling, 2003; McPherson & Osborne, 1988; Michael, 1982; 2000). In other words, the effects of the reinforcement contingency on behavior depend on the motivational context. In terms of human behavior, contexts or settings are conditioned motivational events based on previous interactions between the person and others. Depending on previous interactions, the context can alter how reward contingencies regulate behavior; in one setting rewards can suppress behavior while in another setting the same rewards can increase it.

Consider the history of interaction between a supervisor and employees in a North American business or corporation. Here we assume that the employees have learned the value of freedom from their socialization into Western culture. One kind of interaction could be coercive and controlling, as in an authoritarian (autocratic) style of management (Hersey & Blanchard, 1988; Lewin, Llippit, &White, 1939). The authoritarian boss

dominates or micro-manages employees retaining as much power and decision-making authority as possible, has a low level of trust for employees, does not allow for employee input, and relies on threats and punishments to influence employees. Research shows that this style of management results in confrontation and conflict from employees, high turnover and absenteeism; such a system requires continual pressure and direction from the boss in order to get things done (Mathieu & Zajac, 1990; Michaels & Spector, 1982). Generally, an authoritarian style of interaction conditions the boss and the workplace as aversive and people resent their jobs and perform at low levels.

On the other hand, the history of interaction between a supervisor and an employee could be based on a more democratic (participative) style of management (Hersey & Blanchard, 1988; Lewin et al., 1939). The democratic manager shares decision-making and problem solving responsibilities (while allowing employees to decide how the work will be tackled and who will perform which tasks), encourages employees to develop professionally, and recognises and encourages achievement. Research shows that employees appreciate the trust they receive and respond with cooperation, team spirit, and high morale (Burke & Cooper, 2006; Mathieu & Zajac, 1990). Generally, a democratic management style conditions the supervisor and workplace as positive and people enjoy their jobs and perform at high levels.

Consider what would happen if the boss or supervisor wanted to increase productivity and implemented a new performance-based reward system. The reward system could backfire or succeed depending on the history of interaction between the manager and the employee. Based on the cultural learning of freedom that we have

described, signs of freedom and coercion would become the contexts (conditioned motivational events) for the new reward system.

In a coercive and controlling setting (authoritarian) with time deadlines, threats, and performance evaluations, people would respond to performance-based rewards as more coercive control. In this case, the employees would be de-motivated and their job performance would be suppressed by the reward contingency; they also may experience pressure to act in ways the boss wants and feel controlled by the boss's reward system (non-autonomous). In a coercively-controlled context, the offer of rewards would be expected to reduce intrinsic motivation for job-related work (job satisfaction). Thus, when opportunities arise to engage in job-related activities that are not required, the employees should choose not to do them.

Recall that an autonomy-supportive context (democratic) leads people in our culture to feel free, perceive that they can make choices on their own, and see their behavior as based on personal interests. An autonomy-supportive context presents signs of freedom and personal volition. In this setting, the offer of rewards for performance should reinforce on-task behavior; also, people should experience feelings of autonomy and perceptions of personal agency (self-determination) under these conditions. Thus, an autonomy-supportive context is expected to establish the rewards as reinforcing and increase intrinsic motivation for job-related work. That is, employees should choose to do the job-related activities when the opportunities arise, even though they do not have to do these activities.

In sum, from a behavioral view, the effects of reward contingencies on intrinsic motivation depend on the social context. Based on cultural conditioning, contexts that

signal freedom (autonomy-supportive) would establish rewards as reinforcing and increase intrinsic motivation for the designated activity. In other words, rewards for doing a task in an autonomy-supportive context should lead the person to do the activity when a free-choice opportunity arises. Signs of coercive control should have the opposite effect. These contexts should decrease the effectiveness of the offered rewards or establish rewards as punishers, resulting in a reduction in intrinsic motivation. That is, in a coercively-controlled context, rewards for on-task behavior should lead the person to avoid the activity when the opportunity presents itself.

The Present Research and Hypotheses

At the present time, there are no experiments demonstrating that social contexts involving signs of freedom or coercion moderate the effects of rewards on people's intrinsic motivation. The present research is designed to explore the relationships between social context, rewards, and intrinsic motivation. As in previous experiments (Ryan et al., 1983; Houlfort et al., 2002, Experiment 1), two experiments were conducted that crossed reward contingency (reward/no reward) with social context (autonomy-supportive/coercively-controlled). The difference between this research and previous experiments is that the present study combined several procedures to increase the impact of the reward and social context and to tease out the effect of the rewards from the context in which they are administered.

In Experiment 1 and Experiment 2, participants were offered relatively large amounts of money for engaging in an experimental activity (puzzle solving); the rewards ($10.00) were highly salient, and were placed in front of the participants during the work period. According to CET, large monetary rewards offered merely for doing an activity

are expected to be perceived as highly controlling and should negatively impact intrinsic motivation for the target activity (Deci, et al., 1999a). In Experiment 1, a $10.00 reward was given for working on the puzzle solving activity for 5 minutes regardless of level of performance. In Experiment 2, another level of reward was added to the design in which participants were told they would receive $10.00 if they met an unchallenging performance standard. Both studies also included a non-rewarded control group.

In order to produce a powerful and externally valid manipulation of the social setting, several procedures were employed. These procedures are based on a consideration of supervisory roles in classroom and work settings as well as a sound familiarity with the literature on autonomy and self-determination. For the coercively-controlled conditions, the experimenter provided surveillance by standing over the participant with a clipboard and pencil, pretending to take notes while the participants worked on the puzzles. The use of surveillance has been one procedure that increases control and constraint (Harackiewicz, Abrahams, & Wageman, 1987). Also, participants were given an explicit time deadline (5 min) for working on the experimental task. During the work period, the experimenter held a stopwatch and explained to the participant "it is necessary to insure that you do not exceed the deadline". Deadlines have been used in previous studies to establish feelings of restriction and constraint (Dollinger & Reader, 1983; Reader & Dollinger, 1982). The experimenter gave repeated directives by indicating each minute remaining the participant had to solve puzzles. The coercively-controlled context, based on the combined effects of deadlines, surveillance, and repeated directives by an authority was designed to induce strong feelings of pressure and low feelings of autonomy.

Drawing from the experimental literature on autonomy-supportive events (see Deci & Ryan, 1987), the autonomy-supportive context was established by producing a setting low on surveillance, by removing the experimenter from the work area, and having the experimenter seated in another part of the room involved in her own work. As well, participants were not informed of the five-minute time limit to work on the puzzles.

Predictions Based on CET and Behavioral Theories

Based on previous research and predictions of SDT and CET, it is expected that, for both of the present experiments, there will be additive effects of context and reward on intrinsic motivation measures, but no interaction of reward by context. Specifically, participants in the coercively-controlled context will show less intrinsic motivation than those in the autonomy-supportive conditions. This prediction follows from SDT and the emphasis on the autonomy/self-determination as the basis for innate energy or motivation related to an activity. It is also predicted that participants in reward conditions should spend less time on the puzzle solving activity and rate the activity as less interesting than those in the no reward conditions. According to CET, the participants will perceive the reward as a coercive form of control that stalls self-regulation leading to a loss of intrinsic motivation.

Advocates of CET would argue that there are some conditions under which rewards can offset some of the negative effects in measures of intrinsic motivation--when rewards are perceived as informational and indicative of competence. It is important to note that CET does not predict that rewards administered in an autonomy-supportive environment can produce increases in intrinsic motivation. Autonomy-supportive environments can maintain existing interest in an activity but do not offset the negative

impact of rewards on intrinsic motivation—only competency information can do this. In the first study, rewards were offered and delivered regardless of performance level, providing little or no competency information. Thus, there should be no interaction of context and reward factors with competence information held low and constant. In the second study, a third level of reward was added, reward for meeting a low level of performance. Again, based on the little amount of competency information, I do not expect an interaction of context and reward factors.

From a behavioral view, reward contingencies depend on the context for motivational effects. Rewards for behavior embedded in a coercively-controlled environment should be punishing (or at least not reinforcing), be perceived as pressure to perform, and should de-motivate behavior in a free-choice period. Rewards for behavior given in a context of freedom should be reinforcing, be perceived as positive and should motivate the behavior in a free-choice period. Specifically, participants offered rewards for behavior in a coercively-controlled context should perceive low self-determination, high pressure to perform and decreased intrinsic motivation relative to non-rewarded participants in the same context. Participants rewarded for behavior in an autonomy-supportive context should show an increase in intrinsic motivation compared with non-rewarded participants in the same context. Generally, behavioral theory predicts that intrinsic motivation should be greatest when rewards are given for behavior in autonomy-supportive contexts and least when the rewards are allocated in coercively-controlled settings.

Chapter 2

Experiment 1

This study examined the effects of social context and reward contingencies on intrinsic motivation. Participants worked on a find the difference (FTD) puzzle-solving task in either a coercively-controlled or autonomy-supportive context. The autonomy-supportive context was designed to generate feelings of freedom and perceptions of self-determination. Autonomy support involved manipulations of self-initiation by having participants choose to work at the activity and begin when they were ready, low surveillance, and an absence of time deadlines (low pressure to perform). In contrast, the coercively-controlled context involved the joint effects of initiation of action by authority (the experimenter told participants to work on the puzzles as well as when they could begin), high surveillance, explicit time deadlines (high pressure), and repeated directives from an authority. These manipulations were designed to induce low feelings of autonomy and perceptions of external regulation. As well, half the participants assigned to each context (autonomy vs. controlled) were offered and given $10.00 for working on the FTD puzzles (reward for doing task); the other half were not offered a reward (no reward).

Following the experimental manipulations, participants' rated their feelings of autonomy, competence and perceptions of self-determination (self-initiation, attribution, and choice). The experimenter then made an excuse to leave the participants alone in the room; participants were told they could work on more FTD puzzles, other similar puzzles, read magazines, or do nothing during this period (a ten-minute free-choice phase). The amount of time participants spent on the FTD puzzles, other puzzles, and

both puzzles combined during the free-choice phase made up the behavioral measures of intrinsic motivation; time spent on magazines was an index of off-task behavior. Ratings of task interest were also taken immediately following the free-choice period.

From a behavioral view, I expect that rewards given in a coercively-controlled context will result in low intrinsic motivation. This prediction is expected for the reason that we have been socialised and trained to identify sources of coercive control and restrictions on freedom and act in ways that contest them. Therefore, rewards embedded in such a context should establish the rewards as punishers and in turn undermine intrinsic motivation compared to those who do not receive a reward in a coercively-controlled setting. In contrast, rewards offered in an autonomy-supportive context should result in high intrinsic motivation and liking for the activity since these contexts ought to signal signs of free will and independence; rewards given in this context should establish the rewards as reinforcers and enhance intrinsic motivation relative to those who do not receive rewards in an autonomy-supportive context.

Based on previous research and predictions of CET, rewards are part of context and by their very nature are controlling. From this view, rewards are perceived as coercive thereby augmenting feelings of control and decreasing perceptions of personal agency. It follows that rewards offered and received for puzzle-solving in a coercively-controlled setting may not produce changes in intrinsic motivation, autonomy or self-determination over and above what is expected by those who work in a coercively – controlled context without reward. However, participants rewarded in an autonomy-supportive context should show reduced intrinsic motivation, low feelings of autonomy and diminished perceptions of self-determination relative to those who do not receive

rewards in such an environment because the reward will be experienced as controlling. Recall that from the view of CET, rewards can never produce increases in intrinsic motivation, but the negative effect of rewards can be offset if the reward provides information as to the recipients' competence. Rewards in this study are given for working on the task without respect to any level of performance, therefore, the rewarded group should evidence lower levels of intrinsic motivation compared to the non-rewarded groups. In other words, I expect a main effect of reward.

Method

Design and Participants

The experiment was a 2 x 2 factorial design with two levels of social context (coercively-controlled vs. autonomy-supportive) and two levels of reward (no reward vs. reward). All experimental procedures and measures received ethical approval in accord with the tri-council policy concerning ethical conduct for research involving humans (Tri-council Policy Statement, n.d.). Participants were randomly assigned to one of the four experimental conditions (n = 15 per condition) and run individually. Undergraduate students (n = 60) at a Canadian university were recruited from introductory psychology classes; the students received course credit for their voluntary participation. All participants were native English speakers. One male and one female experimenter ran approximately half of the participants in each experimental condition.

Setting and Materials

The experiment took place in a laboratory with several rooms. In the center of the experimental room there was a large table with two chairs. Items on this table included pens and red markers. In the corner there was another table and chair for the

experimenter. Items on this table included the experimental task, questionnaires, pens, a clipboard, a stopwatch, two current magazines (Canadian Business and Newsweek), and puzzles for the free-choice period. A hidden video camera was mounted in the ceiling of the room in order to unobtrusively record the free-choice measure of intrinsic motivation.

The experimental task was a find the difference (FTD) puzzle solving activity consisting of two cartoon drawings that differed in at least six details (Appendix A). The object was to find the differences between the two drawings. The FTD puzzles have been used in previous studies on reward and intrinsic motivation (e.g., Eisenberger et al., 1999) and are of interest to university students (Eisenberger & Leonard, 1980). Fifteen puzzles were prepared by photocopying each from a local newspaper; puzzles were cut out and laminated, allowing for repeated use throughout the experiment.

The other puzzles used during the free-choice period were cartoon drawings taken from a book of puzzles (see Appendix A). For example, one puzzle is a nature scene of a pond, and the pictures embedded within it are kitchen items such as cutlery or dishware. The objective of the puzzle is to locate the embedded pictures. Other materials included videocassette tapes, questionnaires, money, and participant consent, debriefing, and non-disclosure forms (see Appendix B).

Procedure

When participants arrived at the laboratory, they were asked to leave their personal belongings, electronic devices (i.e., cellular phone, CD player, etc.) and timepieces in the anteroom (see scripts in Appendix C). They were taken to the experimental room, and asked to sit at the large table. Next, participants were given a consent form explaining that the study concerned puzzle solving and behavior,

participation was voluntary, and participants were free to withdraw from the experimental session at anytime without penalty.

Once informed consent was obtained, participants were shown a sample of an FTD puzzle. The experimenter explained to the participants that the purpose of the task was to find the differences between the two cartoon drawings and explained the procedure by having the participant circle three of the differences on the sample puzzle, using a red wet erase marker. Fifteen pairs of FTD puzzles were prepared for the experimental session. Pilot testing indicated that 15 puzzles were far more than any participant could complete during the experiment.

Before participants worked on the FTD puzzles, they were given a questionnaire designed to measure initial interest in the FTD task and interest in puzzle solving in general. Participants were then treated differently by experimental condition.

With a stiff and commanding body posture, the experimenter placed the FTD puzzles face down on the table for those participants assigned to the *coercively-controlled* context. Using an authoritative tone of voice, the experimenter told participants "these are the puzzles that you *must* do for this experiment". While holding a stopwatch, the experimenter firmly stated "there is a strict time deadline of 5 minutes; I will tell you when you can begin solving the puzzles, and I will let you know when the 5-minute time period has ended. I will also tell you each minute that you have remaining." During the work period, the experimenter loomed over participants with a clipboard and pen, pretending to take notes pertaining to the participants' behavior. After 5 minutes, the experimenter told the participants to stop working on the FTD puzzles.

In the *autonomy-supportive* context, the experimenter maintained a relaxed body posture and presented the participants with the same set of FTD puzzles given to participants in the coercively-controlled context. However, for this condition, before placing the puzzles face down on the table, the experimenter provided choice to engage in the activity by asking in a pleasant tone of voice, "would you like to work on some puzzles"? After the participants said yes (all agreed), they were informed that they could turn over the puzzles and begin when they were ready. After delivering the instructions, the experimenter sat in another part of the room involved in his/her own work (low surveillance), and kept track of the time (unbeknownst to the participants). After 5 minutes had passed, the experimenter said to the participants that they had done enough puzzle solving.

The offer of reward followed the context manipulations. Participants assigned to *reward* conditions were told in a neutral tone that they would receive $10.00 for finding differences regardless of how many differences they found, or how many puzzles they worked on. The money was placed on the table in front of them. Participants in no reward conditions were not offered or given money for doing the experimental activity.

For the remainder of the experiential session, the experimenter maintained a natural body stance and used an impartial tone of voice. Following the manipulation and work phase, the experimenter gathered the puzzles and recorded performance data (number of puzzles worked on during the 5 min period and the number of differences found). During this time, participants completed a questionnaire designed to measure feelings about the work atmosphere (manipulation check), feelings of autonomy, competence, and perceptions of personal agency.

Participants assigned to reward conditions also completed an additional questionnaire to collect information concerning their perception of control by the money. The experimenter left the room while participants completed the questionnaires.

The next phase of the experiment was the *free-choice period*. In order to set up this phase, the experimenter returned, collected the questionnaire measures, and stated in a concerned yet apologetic manner that "someone else has arrived for the study, so I need a few minutes to get the person started". Hurriedly, the experimenter grabbed some magazines and puzzles from his/her table and said "while I am gone you can work on more find the difference puzzles, these other puzzles, read magazines, or do whatever you want, but please do not leave the room until I return". While the experimenter said this, s/he placed the materials on the table in front of the participant. The experimenter then left the room for 10 minutes and turned on the video recorder located in an adjacent room to record the free-choice behavioral measures of intrinsic motivation.

After the free-choice period, the experimenter returned and asked the participant to complete a questionnaire that assessed interest in FTD puzzles and puzzles in general. These measures of intrinsic motivation interest were identical to the scales measuring initial interest in the FTD puzzles and interest in solving puzzles in general. All participants then completed a suspicion questionnaire. Two open-ended questions allowed participants to explain if they had formed any ideas about the study and if so, how those ideas affected their performance on the puzzles.

When the suspicion questionnaire was completed, the participants were debriefed. Participants assigned to the no reward conditions were paid $10.00 to equate the payment received by those in reward conditions. The participants were thanked for their

involvement. They were asked not to mention anything that happened during the session to anyone and to sign a non-disclosure form to affirm this. Finally, participants received a written summary of the oral debriefing.

Dependent Measures

Behavioral measures. For all types of puzzles, the measures consisted of the number of puzzles worked on and the number of differences or hidden objects found. To assess the free-choice measures of intrinsic motivation and the measure of alternative behavior (reading magazines), a trained observer, naïve to experimental conditions, viewed the videotapes and recorded the number of seconds in the 10-minute period spent on each of the activities provided to the participant. To ensure reliability of the coding procedure, 8 free-choice sessions (2 from each experimental condition) were randomly selected and coded by a second person. Since participants often changed activities during the free-choice phase, coding was considered reliable if the raters recorded time on any activity within 20 seconds of each other. The coding of all tapes was accurate within 20 seconds.

Bipolar measures. The pre-experimental measure of FTD puzzle interest was comprised of four bipolar items (boring/interesting, dull/exciting, unpleasant/enjoyable, and tedious/entertaining), each measured on a 7-point scale and later coded as -3, -2, -1, 0, 1, 2, and 3 (partial-interval, Osgood, Suci, & Tannenbaum, 1957, p. 74). For each bipolar item, the first descriptor was coded with negative numbers and the mean of the four items made up the task interest scale (Cronbach's Alpha = .84). The same four items were used and coded the same way to measure general interest in puzzle solving.

Six bipolar items (tense/comfortable, constrained/free, nervous/relaxed, anxious/calm, stress/at ease, and pressure/self-controlled) were used to measure affective autonomy; each item was measured on a 7-point scale and subsequently coded as 3, 2, 1, 0, -1, -2, -3. For each bipolar item, the first descriptor was coded with negative numbers and the six items were summed to make the autonomy scale (Cronbach's Alpha = .94). Similarly, 3 bipolar items (unsure/confident, incompetent/competent, and unable/capable) measured with 7-point scales made up the competence measure (Cronbach's Alpha = .90).

Likert measures. In order to check the *social context manipulation*, 7 questions were created using items describing an autonomy-supportive versus a coercively-controlled context (see Deci, Ryan, Gagne, Leone, Usunov, & Kornazhaeva, 2001; Levesque, Stanek, Zuehlke, & Ryan, 2004). Responses to 7-point Likert scales with end points "strongly agree" (coded 7) and "strongly disagree" (coded 1) were used to assess whether the participants felt (a) encouraged to take the initiative, (b) in control of the situation, (c) they had no freedom of choice, (d) they had the opportunity for self-direction, (e) there were a lot of restrictions, (f) that many demands were made on them, and (g) confined by the situation. A rating of 7 on each item indicated participants felt the work atmosphere was highly restrictive; thus, items a, b, and d were reversed scored for the analysis. A factor analysis was conducted on the 7 items using a principle component analysis. Only one factor was extracted accounting for 57.6% of the variance. The items were then summed and averaged to create a composite measure of social context; the reliability index of the scale was Cronbach's Alpha = .87.

Self-determination is based on the degree to which people experience their behavior as volitional and freely chosen, rather than forced by desired outcomes (Deci, et al., 1999b). Thus, for the present study, assessment of *self-determination* consisted of 5 items each measured on a 7-point Likert scale; all items had end points labeled as "strongly agree" (coded 7) and "strongly disagree" (coded 1). Participants indicated that they worked on puzzles (a) because they chose to, (b) because they felt they had to, (c) because the puzzles were interesting, (d) because they were pressured to, and (e) because they wanted to. Items b and d were reversed scored. The 5 items were factor analyzed using a principle component analysis; one factor was extracted accounting for 63% of the variance. The items were summed and averaged to create an index of self-determination, Cronbach's Alpha = .85.

Attributions for FTD puzzle performance were assessed with six items on 7-point scales (1 = strongly disagree, 7 = strongly agree) that asked participants whether their performance on the FTD puzzles was due to (a) time pressure, (b) interest, (c) wanting to please the researcher, (d) their skill, (e) pressure from the situation, and (f) their effort. A score of 7 indicated that participants' performance was due to internal reasons, thus items a, c and e were reverse scored for the analysis. The 6 items were factor analyzed using a principle component analysis with varimax rotation; three factors were identified with eigenvalues great than 1 that accounted for 72% of the variance. The extracted dimensions were labeled as external attribution (33.3% variance, time pressure and situational pressure), internal attribution (20.5% variance, skill and effort), and "contrasting attributions" (18% variance, my interest and please the researcher). The reliability indices for the scales for external attribution, internal attribution, and

contrasting attributions were 0.75, 0.41, and 0.46, respectively. Due to the low reliability of two of the scales, only the *external attribution index* was used in further analyses.

Following the measures of affective autonomy, competence, perceptions of self-determination, and attributions of performance, participants that received rewards responded to 6 items on 7-point Likert rating scales (1 = strongly disagree, 7 = strongly agree) that measured whether a) they enjoyed receiving the money, b) they felt controlled by the money, c) the money increased their interest in FTD puzzles, d) they felt pressured by the money, e) the money provided them with feedback to evaluate their performance, and f) the money motivated to perform well on FTD puzzles. A rating of 7 indicated low control by the money; thus items b and d were reverse scored.

Suspiciousness check. Participants responded to 2 open ended questions that asked them whether they formed any ideas about the study and if so, how those ideas affected their performance on the puzzles. Answers were subsequently coded in terms of level of suspicion about manipulations and procedures with 1 indicating no suspicion, 2 as low suspicion, 3 as moderate suspicion and 4 as high suspicion.

Results

Suspiciousness Check

None of the participants formed any ideas about the experimental hypotheses or reported that the ideas they formed affected their performance; thus, all data were used in the subsequent analyses.

Manipulation Check

Immediately following the manipulations, participants responded to 7 items that assessed the work atmosphere during the puzzle solving activity. A 2-way ANOVA

revealed a significant main effect of context $F(1,56) = 29.49, p < .001$, no main effect of reward $F(1, 56) = 2.79, p = .10$ and no interaction effect of context by reward $F(1, 56) = .13, p = .72$. Participants in the coercively-controlled context indicated that the work atmosphere was more coercive ($M = 3.29$, $SD = 1.03$) than those in the autonomy-supportive context ($M = 2.06$, $SD = .70$). Thus, the context manipulation successfully produced statistically significant differences between the context conditions. However, the mean rating of the coercively-controlled context group did not rise above the midpoint of 4 on the 7-point scale. Apparently, the context manipulation was not powerful enough to induce participants in the coercively-controlled context to rate the work atmosphere as highly restrictive; instead, they rated the atmosphere as less autonomy-supportive.

Pre-experimental Interest

FTD puzzles. An analysis of participants' interest of FTD puzzles (4 bipolar items) prior to the manipulations revealed that on average, participants rated the FTD task as initially interesting ($M = .88$, $SD = .89$). A two way analysis of variance (2-way ANOVA) revealed no main effect of context $F(1, 56) = .26, p = .6$, no main effect of reward $F(1, 56) = 1.19, p = .28$, and no interaction effect of context by reward $F(1, 56) = 2.33, p = .13$. These findings indicate that the conditions were equated on average for pre-experimental interest in FTD puzzles.

General puzzle interest. An ANOVA conducted on general puzzle interest revealed no main effect of context $F(1, 56) = .11, p = .74$, no main effect of reward $F(1, 56) = .65, p = .42$, but a significant interaction of context by reward, $F(1, 56) = 11.77, p < .05$. Specifically, participants assigned to the autonomy-supportive reward condition had

greater general puzzle interest (M = 1.62, SD = .99) than those in the autonomy-supportive no reward group (M = .57, SD = 1.01). Also, participants assigned to the coercively-controlled reward group reported lower interest in general puzzle solving (M = .68, SD = 1.11) than those in the coercively-controlled no reward condition (M = 1.33, SD = .69). These findings suggest that the groups were not well equated in terms of general puzzle interest prior to the experimental manipulations.

To address the problem of initial differences by condition, general puzzle interest was analyzed by 2 X 2 X 2 repeated measures analysis of variance, with experimental phase (pre-experimental and free-choice) as the within groups factor and 2 levels of reward and 2 levels of social context as between group factors. A similar analysis was applied to FTD interest because before-after measures also were obtained for this variable. In addition to testing differences between experimental conditions, these mixed-ANOVA analyses test whether there was a change in FTD interest and general puzzle interest from the pre-experimental to the free-choice periods.

Free-choice Intrinsic Motivation

Three behavioral measures of intrinsic motivation and a measure of alternative behavior were taken during the free-choice phase. All measures were based on the number of seconds in a 10-minute period that participants spent time a) solving FTD puzzles, b) solving other available puzzles, c) solving all puzzles, or d) reading magazines.

Time spent on FTD puzzles. A 2-way ANOVA revealed no main effect of context, $F(1, 56) = .36$, $p = .55$, no main effect of reward, $F(1, 56) = 2.05$, $p = .16$, and no interaction of context by reward, $F(1, 56) = 1.01$, $p = .32$. Thus, there were no statistically

significant differences by experimental condition for amount of time participants spent doing FTD puzzles during the free-choice phase.

Time spent on alternative puzzles. A 2-way ANOVA conducted on the time participants spent on other puzzles showed no main effect of context, $F(1, 56) = 2.11$, $p = .15$, no main effect of reward, $F(1, 56) = 1.81$, $p = .18$, and no interaction effect of context by reward, $F(1, 56) = .12$, $p = .74$. Participants did not significantly differ by experimental condition in terms of the amount of time spent on other puzzles during the free-choice phase.

Time spent on all available puzzles. A 2-way ANOVA conducted on the time participants spent doing FTD and other puzzles combined revealed no main effect of context, $F(1, 56) = 2.64$, $p = .11$, a significant main effect of reward, $F(1, 56) = 5.05$, $p = .03$, and no interaction of context by reward, $F(1, 56) = .1.24$, $p = .27$. Participants in reward conditions spent more time working on both types of puzzles ($M = 293.23$, $SD = 242.89$) compared to participants in no reward conditions ($M = 157.47$, $SD = 232.86$). However, a primary assumption underlying the analysis of variance is that the time spent on puzzle solving is normally distributed. Inspection of the distribution indicated that the variable was non-normal with modes near zero (no time on task) and 600 seconds (all time on task). Because of these problems in meeting the assumptions of ANOVA, the time spent on puzzle solving was analyzed again using nonparametric statistics.

A Kruskal-Wallis test was performed to evaluate differences among the 4 conditions, autonomous reward (AR), controlling reward (CR), autonomous no reward (ANR), and controlling no reward (CNR). The test was significant, $X^2(3, N = 60) = 11.40$, $p = .01$. Figure 2.1 shows the mean ranks (MR) of time spent solving puzzles by

experimental condition. The values of the mean ranks shown in Figure 2.1 by experimental condition are: AR = 42.40, CR = 31.40, ANR = 24.53, and CNR = 23.67. Since the overall test was significant, follow-up tests were conducted to evaluate pairwise differences among the 4 groups, controlling for Type I error across tests by using the Holm's sequential Bonferroni approach (Green & Salkind, 2004). Alpha levels were determined for each comparison by dividing the conventional alpha level of .05 by the number of comparisons, less 1. Table 2.1 shows the groups compared, the corrected alpha, and the observed p-value for each comparison.

As can be seen from Table 2.1, the tests revealed a significant difference between the AR and ANR groups, $p = .01$ and AR and CNR groups, $p = .003$. Participants who received reward in an autonomy-supportive context spent more time solving puzzles ($MR = 42.40$) compared to those who did not receive a reward in both the autonomy-supportive context ($MR = 24.53$) and the coercively-controlled context ($MR = 23.67$). No other comparisons were statistically significant. The results of the non-parametric test teased out the finding that it is not just participants who received a reward (as the 2-way ANOVA revealed), but participants who received a reward in an autonomy-supportive context that increased the time spent on the activity. These findings provide evidence that environments can be arranged in a manner where the introduction of incentives can increase the time people spend on an activity.

Time spent on alternative behavior. A 2-way ANOVA conducted on time spent on magazines revealed no effect of context, $F(1, 56) = 3.10$, $p = .08$, a significant main effect of reward, $F(1, 56) = 4.28$, $p = .04$, and no interaction effect of context by reward, $F(1, 56) = .95$, $p = .34$. Participants in no reward conditions spent more free time reading

magazines ($M = 433.03$, $SD = 240.37$) relative to participants who received a reward ($M = 306.00$, $SD = 243.87$). To some extent, this finding implies that rewards reduced time spent on alternative activities (e.g. magazines) by increasing time spent on puzzles during the free-choice period.

Again, these data failed the normality assumption of the ANOVA, thus the data were reanalyzed, using the same non-parametric analysis of ranks conducted for the time spent on puzzles during the free-choice phase. The test was significant, $X^2(3, N = 60) = 10.44$, $p = .02$. Figure 2.2 shows the mean ranks of time spent reading magazines by experimental condition. Table 2.2 shows the groups compared, the corrected alpha, and the observed p-value for each follow-up pairwise comparison.

As can be seen from Table 2.2, the tests revealed a significant difference between the AR and ANR groups, p = .02 and AR and CNR groups, p = .003. Figure 2.2 depicts the statistically significant comparisons. Figure 2.2 shows that non-rewarded participants who worked in the autonomy-supportive context spent more time on magazines ($MR = 34.93$) than those who received rewards in the same context ($MR = 19.03$). As well, participants in the no reward coercively-controlled context spent more time on magazines ($MR = 20.17$) compared to those in the no reward autonomy-supportive context ($MR = 10.83$). No other comparisons were significant. Rewards offered in an autonomy-supportive context reduced the amount of time participants spent on alternative activities (e.g., magazines). These findings suggest that rewards provided for doing an activity in a context that signals freedom and independence reduces off-task behavior (reading magazines)—presumably because people perceive that they have freely chosen to engage in the target activity and enjoy doing so.

FTD interest. A 2 X 2 X 2 repeated measures analysis was performed on the measure of FTD task interest with pre-experimental and free-choice phases as the within groups factor. The between groups results revealed no main effect of context $F(1, 56) = .01$, $p = .91$, no main effect of reward $F(1, 56) = 1.88$, $p = .18$, but a significant interaction effect of context by reward $F(1, 56) = 4.23$, $p = .04$. For participants in the autonomy-supportive context, those who received rewards indicated more interest in FTD puzzles ($M = 1.33$, $SD = .99$) compared to those who did not receive a reward ($M = .83$, $SD = 1.02$). In contrast, participants rewarded for doing the task in a coercively-controlled context showed less interest ($M = .54$, $SD = .84$) than those in the coercively-controlled no reward condition ($M = .99$, $SD = .79$).

The within groups analysis indicated a significant effect of context by time, $F(1, 56) = 7.20$, $p = .02$, no effect of reward by time, $F(1, 56) = 1.59$, $p = .21$, and a significant effect of context by reward by time, $F(1, 56) = 5.61$, $p = .02$. Figure 2.3 shows that for the autonomy-supportive context conditions, the reward group increased interest in FTD puzzles relative to the no reward group. In the coercively-controlled context, Figure 2.3 shows that neither group changed interest over time. These findings suggests that when rewards are offered in an autonomy-supportive context, interest for an activity increases.

General puzzle interest. A repeated measures analysis was also conducted on general puzzle interest. For the within subjects analysis, there was no main effect of context by time, $F(1, 56) = .28$, $p = .60$, no effect of reward by time, $F(1, 56) = 2.18$, $p = .14$, and no effect of context by reward by time, $F(1, 56) = .79$, $p = .38$. These results show that there was no change in general puzzle-solving interest over the course of the experiment as a function of the experimental conditions.

Affective Autonomy

A 2-way ANOVA on the composite measure of autonomous feelings showed a significant main effect of context, $F(1, 56) = 38.18$, $p < .001$, no main effect of reward, $F(1, 56) = 0.35$, $p = .56$, and no interaction effect of context by reward, $F(1, 56) = 0.49$, $p = .49$. Participants who worked on the FTD puzzles in the autonomy-supportive context reported significantly stronger feelings of autonomy ($M = 1.82$, $SD = .95$) than those assigned to the coercively-controlled context ($M = -0.04$, $SD = 1.32$). These results suggest that environments can be organized to increase peoples' feelings of freedom.

Self-determination

The 2-way ANOVA on the composite measure of perceptions of self-determination revealed no main effect of context, $F(1, 56) = 2.73$, $p = .10$, a significant main effect of reward, $F(1, 56) = 4.29$, $p = .04$, and no interaction effect of context by reward, $F(1, 56) = .04$, $p = .50$. Regardless of the social context, participants who received rewards for doing the FTD puzzles perceived themselves as initiators of action ($M = 5.14$, $SD = 1.36$) to a greater extent then non-rewarded participants ($M = 4.47$, $SD = 1.19$). Thus, rewards positively changed participants' perceptions of volition and control.

Attributions of Performance

A 2-way ANOVA was conducted on the composite measure of external attribution (situational and time pressure). The ANOVA detected a significant main effect of context $F(1, 56) = 31.30$, $p = .001$, no main effect of reward $F(1, 56) = .17$, $p = .68$, and no interaction effect of context by reward $F(1, 56) = .001$, $p = .97$. Participants in the autonomy-supportive context attributed their performance less to external pressures ($M = 2.99$, $SD = 1.06$) than those in the coercively-controlled context ($M = 4.62$, $SD = 1.16$).

This suggests that an autonomy-supportive context diminishes attributions of one's performance to external sources.

Competence

The 2-way ANOVA on the composite measure of competence revealed a significant main effect of context, $F(1, 56) = 5.32$, $p = .03$, no main effect of reward $F(1, 56) = 1.22$, $p = .28$, and no interaction effect of context by reward, $F(1, 56) = .09$, $p < .77$. Participants in the autonomy-supportive context felt significantly more competent ($M = 2.22$, $SD = .88$) than those in the coercively-controlled context ($M = 1.71$, $SD = .83$). Thus, feelings of competency were increased when people worked in an autonomy-supportive setting.

Performance for the Work Phase

To assess performance for the work or puzzle-solving phase, 2-way ANOVA's were conducted on the number of differences found and the number of puzzles worked on. In terms of number of differences, the analysis revealed a significant main effect of context $F(1, 56) = 28.33$, $p < .001$, no main effect of reward $F(1, 56) = 1.33$, $p = .25$ and no interaction effect of context by reward, $F(1, 56) = .39$, $p = .54$. Participants in the coercively-controlled context found significantly more differences than participants in the autonomy-supportive context, ($M = 38.27$, $SD = 10.94$; $M = 24.90$, $SD = 8.29$, respectively). Similarly, the analysis of number of puzzles work on revealed a significant main effect of context $F(1, 56) = 23.95$, $p < .001$, no main effect of reward $F(1, 56) = 0.89$, $p = .35$ and no interaction of context by reward, $F(1, 56) = 0.18$, $p = .67$. Participants in the coercively-controlled context worked on significantly more puzzles ($M = 9.13$, $SD = 3.65$) than those in the autonomy-supportive context ($M = 5.33$, $SD = 2.12$).

Thus, the coercively-controlled context increased participants' puzzle-solving performance.

Performance for the Free-choice Phase

The number of puzzles worked on and the number of differences found were intended to serve as measures of performance during the free-choice phase. Unfortunately, while participants appeared to be working on puzzles (looking at or holding the puzzles), not all participants circled differences on the pages. Thus, there was not enough data per condition to analyze performance during the free-choice phase.

Monetary Reward Ratings

Participants in reward conditions rated the monetary rewards in terms of enjoyment, control, interest, pressure, feedback, distraction, and motivation on 7-point Likert scales. One-sample *t*-tests were conducted comparing the observed means against a hypothesized value of 4, the neutral value on the 7-point scale. For each test, the level of significance was set to .007 using a Bonferroni correction (Shaffer, 1995) because there were 7 items tested. Six of the seven items were significantly different from neutral using the corrected alpha.

Participants who receive a reward did not feel controlled $t(28) = -5.17$, ($M = 2.37$, $SD = 1.73$); pressured $t(28) = -4.28$, ($M = 2.60$, $SD = 1.79$); or distracted by the money $t(28) = -8.95$, ($M = 1.87$, $SD = 1.31$), all p's $< .001$. Participants also reported that the money did not provide them with feedback to evaluate their performance $t(28) = -9.70$, ($M = 1.80$, $SD = 1.24$), nor did it motivate them to perform well on the FTD puzzles $t(28) = -2.95$, ($M = 3.00$, $SD = 1.86$), both p's $< .001$. On the other hand, participants reported that they enjoyed receiving the money $t(28) = 9.54$, $p < .01$, ($M = 6.13$, $SD = 1.22$). There

was no significant effect on the item that asked participants whether the money increased their interest in FTD puzzles $t(28) = -1.85$, $p = .07$, *ns*, ($M = 3.33$, $SD = 1.97$). Overall, the results show that participants did not feel controlled by the money. Further, it did not motivate participants to perform well on the FTD puzzles or provide participants with feedback to evaluate their performance. Nonetheless, participants enjoyed receiving the rewards.

Discussion

The major findings from Experiment 1 were that people who were rewarded in an autonomy-supportive context for spending time on an activity subsequently spent more time on that activity and less time on off-task behavior (reading magazines) in a free-choice setting. These participants also showed an increase in interest between the initial and free-choice measures that did not occur for participants rewarded in a coercively-controlled context or for those not rewarded in either context. Generally, intrinsic motivation increased when rewards were used in a setting that emphasized choice, low surveillance by an authority, and self-initiation of performance.

It was expected that participants rewarded in a coercively-controlled context would be de-motivated, resulting in a decline of intrinsic motivation. However, there were no findings to support this prediction. The context manipulation, according to participants, was not viewed as excessively restrictive. Although participants in the coercively-controlled context reported that the work atmosphere was more restrictive relative to participants who worked in the autonomy-supportive setting, their ratings did not exceed the midpoint of 4 on the 7-point scale. The procedures to manipulate the coercively-controlled context combined surveillance, deadlines, and no opportunity for

choice which should have induced strong feelings of domineering control. Nonetheless, the manipulation did produce a strong significant difference between the two contexts.

Results from the context manipulation showed that settings that signaled freedom increased participants' feelings of autonomy and competence. Specifically, participants who worked on puzzles in the autonomy-supportive context reported stronger feelings of autonomy (low pressure-tension) and felt more competent at the task than those who worked in a setting that was restrictive. As well, these participants were less likely to attribute their behavior to external pressures.

Coercively-controlled settings produced unexpected effects in terms of participants' performance. A setting that offered low choice, was monitored by a person in authority, and had time deadlines imposed on the activity produce high levels of performance. That is, participants who worked in the severely limiting context found more differences and worked on more puzzles than participants who worked in an autonomy-supportive setting. As well, these participants also attributed their behavior more to external pressures. Essentially, a restrictive context increased performance while at the same time intensifying feelings of pressure and plummeting feelings of competence.

The reward manipulation positively impacted self-determination. Participants who received rewards for an activity perceived themselves as initiators of action to a greater extant than those not receiving rewards. The measure of agency was not impacted by the context manipulation.

As expected based on the reward contingency (doing or spending time on the task), rewarded participants reported that the money did not provide them with feedback

to evaluate their performance. But the rewards also did not motivate them to perform well or make participants feel controlled or pressured. The low motivational value of money for the participants may be one reason that the monetary contingency was not experienced as highly controlling—although the amount of monetary payment in this study was substantial and equal to or greater than in previous investigations.

Another reason could be the time-based reward contingency. Recall that participants given rewards for spending time on a task in the coercively-controlled context indicated the work atmosphere was more limiting than participants in the autonomy-supportive context, but their ratings did not exceed the midpoint of 4 on the scale. Assuming that the context manipulation was effective, it may be that the time-based reward contingency was not perceived as controlling. Rewards given for spending time on a task do not convey clear performance standards; however, CET suggests that rewards tied to performance standards are perceived as more detrimental than rewards given for simply doing or spending time on a task. Consequently, to increase participants' perceptions of coercive control, rewards were offered contingent on meeting a performance standard in Experiment 2.

As noted, participants were not motivated by the money and the money did not destroy participants' interest in puzzle solving, since they showed a positive change in interest between the initial and free-choice phases of the experiment. As a result, Experiment 2 addressed this issue by adding one item to the money questionnaire to determine if rewards destroyed participants' intrinsic motivation.

Figure 2.1. Presented by experimental condition are the mean ranks of time spent on puzzles during the free-choice phase.

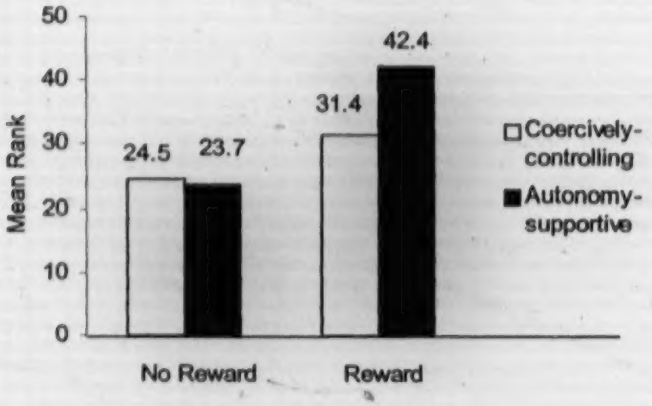


Figure 2.2. The mean ranks of time spent on alternative behavior (reading magazines) presented by experimental condition.

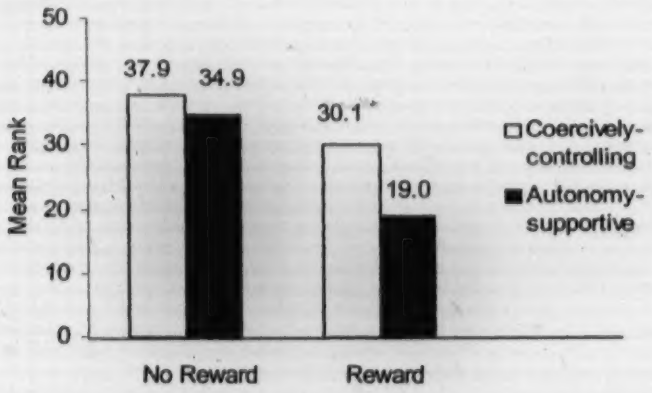


Figure 2.3. Depiction of the change in FTD interest over the course of the experiment as a function of the experimental conditions.

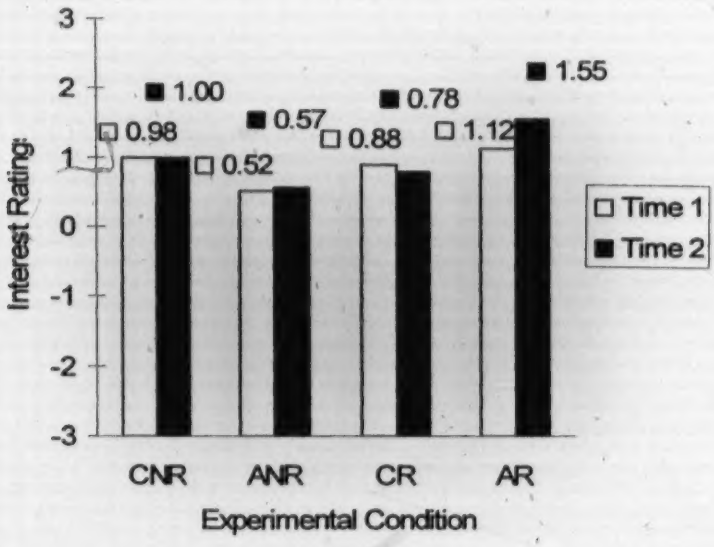


Table 2.1

Summary of the Mann-Whitney pair-wise comparisons, corrected alphas, and observed p-values for time spent solving puzzles.

Pairwise Comparison	Corrected Alpha	Observed p-value
ANR vs CNR	01	.94, ns
ANR vs CR	.01	.217, ns
CNR vs CR	.01	.217, ns
AR vs CR	.02	.05, ns
AR vs ANR	.03	.01, sig
AR vs CNR	.05	.003, sig

Table 2.2

Summary of the Mann-Whitney pair-wise comparisons for time spent on alternative behavior (reading magazines).

Pairwise Comparison	Corrected Alpha	Observed p-value
ANR vs CNR	.01	.68, ns
ANR vs CR	.01	.37, ns
CNR vs CR	.01	.22, ns
AR vs CR	.02	.05, ns
AR vs ANR	.03	.02, sig
AR vs CNR	.05	.003, sig

Chapter 3

Experiment 2

Experiment 2 tested whether rewards for meeting a specified performance standard in an autonomy-supportive context would increase intrinsic motivation. According to CET, this reward contingency is experienced as highly controlling by individuals, thereby having greater deleterious effects on intrinsic motivation (Deci, et al., 1999). However, CET posits that the negative impact of the reward on intrinsic motivation is offset to some degree if the reward provides information on competence to the participant. To ensure that changes in intrinsic motivation are not confounded by competency feedback, rewards were offered for meeting an undemanding performance standard. With this reward contingency, the rewards should be experienced as highly controlling without providing information to infer and evaluate competence. These controlling rewards given for performance in a coercive context were expected to decrease intrinsic motivation relative to a no reward coercively-controlled context treatment—a result not obtained in the first experiment. Experiment 2 also arranged for a test on FTD puzzles following the free-choice period to obtain a behavioral measure of performance and to assess whether gains or losses of intrinsic motivation were associated with performance on a problem-solving task. A final objective was to add a questionnaire item that asked participants if the monetary rewards reduced their interest in FTD puzzles.

Method

Design and Participants

The experimental design was a 2 x 3 factorial with two levels of social context (coercively-controlled or autonomy-supportive) and three levels of reward (no reward, rewards for doing, or rewards for meeting a performance standard). Undergraduate students in sociology were recruited as volunteers ($N = 104$) and received course credit for their participation. Participants were randomly assigned to one of the six experimental conditions (coercively-controlled: no reward, $n = 18$, reward doing, $n = 16$; reward standard, $n = 16$ and autonomy-supportive: no reward, $n = 17$; reward doing, $n = 18$, reward standard, $n = 17$). Due to a malfunction of the recording equipment, the free-choice time data for 2 participants was lost.

Setting and Materials

The setting and materials were identical to Experiment 1, with the exception of the 3-minute test materials. The test booklet consisted of 10-laminated FTD puzzles that were different from those worked on during the reward and context phase or those available during the free-choice phase.

Procedure

The procedure for Experiment 2 was the same as the first experiment except for adding a third reward condition, rewards for meeting a performance standard and a 3-minute timed test following the free-choice phase.

For the performance standard reward conditions, participants were told that they would receive 10 dollars if they found at least 20 differences. The number of differences set for the test was based on Experiment 1. In that study, 80% of the participants found

20 differences, regardless of experimental condition. Thus, finding 20 differences was established as a relatively undemanding performance standard.

Following the free-choice phase, all participants were informed that they were ready for a 3-minute assessment (the test). In order to reduce switching between FTD puzzles during the test, participants were told that they had to find at least 4 differences on a given puzzle before moving to the next one. Before the participants worked on the puzzles, they indicated how many differences they expected to find during the 3-minute assessment. During the test, the experimenter sat in another part of the room and kept track of the time while participants worked on the FTD puzzles. When the assessment period was over, participants were told to stop and were given the final suspiciousness questionnaire to complete.

The dependent measures were the same as in Experiment 1, with the addition of one question asking if money took away participants' interest (1 = not at all, 7= very much). The FTD test measures were the number of differences found and the number of puzzles worked on in 3 minutes.

After the suspicion questionnaire was completed, the participants were debriefed. Those assigned to the no reward conditions were paid $10.00 to equate them with the payment received by participants in reward conditions. The participants were thanked for their involvement and asked not to mention anything that happened during the session to anyone and sign a non-disclosure form to affirm this. Finally, they received a written summary of the oral debriefing.

As in Experiment 1, for the free-choice measures of intrinsic motivation, a trained observer, unaware of the experimental conditions, viewed the videotapes and recorded

the number of seconds in the 10-minute period spent on each of the activities provided to the participant. Two free-choice sessions from each of the six experimental conditions were randomly selected and coded by another rater to ensure reliability of the coding procedure. Coding was considered reliable if the raters recorded time on any activity within 20 seconds of each other, since participants often changed activities during the free-choice phase. The coding of all tapes was accurate within 20 seconds.

Results

Suspiciousness Check

Participants responded to 2 open-ended questions about whether they formed any ideas about the study and if so, how those ideas affected their performance on the puzzles. Answers were subsequently coded in terms of level of suspicion about manipulations and procedures with 1 indicating no suspicion, 2 as low suspicion, 3 as moderate suspicion and 4 as high suspicion. No participants formed any ideas in accord with the experimental hypotheses or reported that the any ideas affected their performance.

Manipulation Check

Immediately following the reward and social context manipulations, participants responded to 7 items that assessed the work atmosphere during the puzzle solving activity. A 2-way ANOVA revealed a significant main effect of context, $F(1, 98) = 24.18$, $p = .001$, no main effect of reward, $F(2, 98) = 1.27$, $p = .29$ and no interaction of context by reward, $F(2, 97) = .40$, $p = .67$. Participants in the coercively-controlled context felt the work atmosphere was significantly more controlling ($M = 3.62$, $SD = 1.28$) compared to those in the autonomy-supportive context ($M = 2.57$, $SD = .82$). These

results suggest that the social context differed in terms of degree of coercive control. As in Experiment 1, participants in the coercive-controlled context conditions did not rise above the midpoint of 4 on the 7-point scale indicating that the context manipulation was not powerful enough to induce participants to rate the work atmosphere as highly restrictive, merely less autonomous.

Initial Interest

A check on initial interest of FTD puzzles (4 bipolar items) revealed that participants rated the FTD task as initially interesting ($M = .82$, $SD = 1.10$). A 2-way ANOVA revealed no main effect of context, $F(1, 98) = 1.02$, $p = .31$, no main effect of reward, $F(2, 98) = .75$, $p = .48$, and no interaction effect of context by reward, $F(2, 98) = .90$, $p = .41$. A 2-way ANOVA conducted on general interest in puzzles revealed no main effect of context, $F(1, 98) = 1.06$, $p = .31$, no main effect of reward, $F(2, 98) = 1.17$, $p = .32$, and no interaction of context by reward, $F(2, 98) = .86$, $p = .43$. These results suggest that the experimental conditions were equated on initial interest in FTD puzzles and general interest in solving puzzles.

Free-choice Intrinsic Motivation

Time spent on FTD puzzles. A 2 x 3 ANOVA was conducted to evaluate the effects of two levels of context and three levels of reward contingency on free-choice time spent on FTD puzzles. The means and standard deviation for free-choice intrinsic motivation as a function of the two factors are presented in Table 3.2. The results for the ANOVA indicated no main effect of context, $F(1, 96) = .07$, $p = .795$, no main effect of reward, $F(2, 68) = 1.52$, $p = .224$, and a significant interaction of context by reward, $F(2, 96) = 4.69$, $p = .011$.

Follow-up tests were conducted to evaluate the pair wise differences between the two factors. The tests revealed a significant difference between participants in the no reward and reward standard conditions within the autonomy-supportive context, $F(1, 96) = 4.572$, $p = .035$, but no significant difference between no reward and reward standard for the coercively-controlled conditions, $F(1, 96) = .03$, $p = .865$.

To further clarify the results, the data were analyzed as a 2 X 2 ANOVA with two levels of reward (no reward vs. reward standard) and two levels of context (coercively-controlled vs. autonomy-supportive). There was a marginally significant main effect of context $F(1, 64) = 3.42$, $p = .069$, no effect or reward $F(1, 64) = 2.45$, $p = .122$ and a marginally significant interaction of context by reward, $F(1, 64) = 3.34$, $p = .072$. Figure 3.1 depicts the form of the interaction and shows that free time spent on FTD puzzles (the target activity) increased when rewards were offered for achieving a level of performance in an autonomy-supportive context.

Time spent on alternative puzzles. Free time spent on the other puzzles was analyzed using a 2 x 3 ANOVA. All results of the test were not statistically significant. There was no effect of context, $F(1, 96) = 1.30$, $p = .257$, reward, $F(2, 96) = .10$, $p = .905$, and no significant interaction of the two factors, $F(1, 96) = .12$, $p = .885$.

Time spent on all available puzzles. The time participants spent on all puzzles was analyzed using a 2 x 3 ANOVA; means and standard deviations of the test are presented in Table 3.2. The test results confirmed that there was no main effect of context, $F(1, 96) = 1.76$, $p = .19$, no main effect of reward, $F(2, 96) = 1.10$, $p = .34$, but a significant interaction of context by reward, $F(2, 96) = 3.62$, $p = .03$.

In order to clarify the significant interaction effect, a 2 x 2 ANOVA was conducted with reward (no reward and reward standard) and context (autonomy-supportive and coercively-controlled) as the factors. The results of the test revealed a marginally significant interaction, $F(1, 64) = 3.77$, $p = .057$, depicted in Figure 3.2. Planned comparisons revealed significant differences between participants assigned to autonomy-supportive and coercively-controlled reward standard groups $t(31) = 3.25$, $p = .003$, and between those who received a reward for meeting a standard vs. no reward in an autonomy-supportive context $t(32) = 2.62$, $p = .014$.

Participants rewarded for meeting a performance standard in the autonomy-supportive setting spent more time solving puzzles ($M = 487.7$, $SD = 242.0$) than those rewarded in the coercively-controlled context ($M = 295.2$, $SD = 183.3$); for the autonomy-supportive context, reward standard participants spent more time solving puzzles ($M = 487.7$, $SD = 183.3$) compared to those who did not receive a reward ($M = 246.5$, $SD = 240.9$). No other comparisons were significant. In sum, these results suggest that performance based rewards increased intrinsic motivation when given in an autonomy-supportive context.

Time spent on alternative behavior. A 2 x 3 ANOVA was conducted on the time participants spent on looking at magazines, as off-task alternative behavior. There was no main effect of context, $F(1, 96) = 1.41$, $p = .238$, no main effect of reward, $F(2, 96) = 1.13$, $p = .326$, but a significant interaction of context and reward, $F(2, 96) = 3.53$, $p = .003$.

A 2 x 2 ANOVA analyzed reward (no reward vs. reward standard) by context (autonomy-supportive vs. coercively-controlled). The test revealed a significant main

effect of reward, $F(1, 64) = 4.67$, $p = .034$. Participants who did not receive a reward spent more time on magazines ($M = 270.7$, $SD = 240.5$) compared to those who did receive a reward ($M = 216.7$, $SD = 245.7$). The results of the interaction are presented in Figure 3.3. The pattern of findings suggests that the autonomy-supportive reward standard group decreased off-task alternative behavior.

FTD interest. Following the free-choice period, ratings of FTD puzzle interest were taken. A 2 x 3 ANOVA was conducted on this measure. There was no main effect of context, $F(1, 98) = 2.13$, $p = .15$, no main effect of reward, $F(2, 98) = .36$, $p = .70$, and no interaction effect of context by reward, $F(2, 98) = 1.31$, $p = .27$. These results indicate that there is no evidence that reward and context combine to affect the FTD interest measure of intrinsic motivation. A 2 X 2 X 2 repeated measures analysis was also performed on the measure of FTD task interest with pre-experimental and free-choice phases as the within groups factor. The test revealed no significant effects.

General puzzle interest. A 2 x 3 ANOVA conducted on participants ratings of interest in puzzle solving activities revealed no main effect of context, $F(1, 98) = 2.73$, $p = .10$, no main effect of reward, $F(2, 98) = .15$, $p = .86$, and no interaction effect of the two factors, $F(2, 98) = .78$, $p = .46$. Reward and context did not affect free-choice interest in puzzle solving in general. Results of a 2 X 2 X 2 repeated measures analysis on general interest in puzzle solving with pre-experimental and free-choice phases as the within groups factor revealed no significant effects.

Affective Autonomy

A 2 x 3 ANOVA on the composite measure of autonomy showed a main effect of context, $F(1, 56) = 38.18$, $p < .0001$, no main effect of reward, $F(1, 56) = 0.35$, $p = .56$,

and no interaction effect of context by reward, $F(1, 56) = 0.49$, $p = .49$. Participants who worked on the FTD puzzles in an autonomy-supportive context indicated stronger feelings of autonomy ($M = 1.82$, $SD = .95$) than those assigned to the coercively-controlled conditions ($M = -0.04$, $SD = 1.32$). The results of the test indicate that social contexts can be arranged to increase peoples' feelings of volition and independence.

Self-determination

The 2 x 3 ANOVA on the composite measure of self-determination revealed no main effect of context, $F(1, 98) = 1.74$, $p = .19$, a significant main effect of reward, $F(2, 98) = 4.19$, $p = .02$, and no interaction of context by reward, $F(2, 98) = .78$, $p = .46$. Post hoc comparisons of means shows that regardless of the context, participants who received rewards for meeting a performance standard perceived their behavior as more self-determined ($M = 5.22$, $SD = 1.20$) than participants who received a reward for merely spending time on the puzzles ($M = 4.44$, $SD = 139$) or those who did not receive a reward ($M = 4.39$, $SD = 1.40$). These results suggest that rewards increase perceptions of the self as an initiator of action.

Attributions of Performance

The six items assessing attribution for FTD puzzle performance (time pressure, interest, please the researcher, skill, situational pressure, and effort) were factor analyzed using a principle component analysis with varimax rotation; two factors were identified with eigenvalues great than 1 that accounted for 62% of the variance. The extracted dimensions were labelled as "external attribution" (26.4% variance, time pressure, situational pressure, please the researcher), and "internal attribution" (35.9% variance,

skill, effort and interest). The reliability indices for the scales were .60 and .73, respectively.

The 2 x 3 ANOVA on external attribution revealed a significant main effect of context, $F(1, 98) = 24.97$, $p = .001$, no main effect of reward, $F(1, 98) = 1.87$, $p = .159$ and a significant interaction of context by reward, $F(2, 98) = 4.86$, $p = .01$. To examine the significant interaction, pairwise comparison follow-up tests showed a significant difference between the no reward and reward standard conditions in the autonomy-supportive context, $F(1, 98) = 11.68$, $p = .001$; there were no differences by reward conditions for those who worked in a coercively-controlled context, $F(1, 98) = 1.02$, $p = .316$. In effect, participants working in an autonomy-supportive context and received rewards for achieving a performance standard attributed their performance less to external factors ($M = 2.91$, $SD = 1.13$) than those who did not receive a reward ($M = 4.24$, $SD = .92$).

For the internal attribution measure, the 2 x 3 ANOVA revealed no main effect of context, $F(2, 98) = 1.94$, $p = .17$, no main effect of reward, $F(2, 98) = 2.31$, $p = .11$, and no interaction effect of context by reward, $F(2, 98) = 1.07$, $p = .35$. In other words, the experimental conditions did not cause people to attribute their behavior more to internal causes.

Competence

The 2 x 3 ANOVA on the composite measure of competence revealed a significant main effect context, $F(1, 98) = 5.98$, $p = .02$, a significant main effect of reward, $F(2, 98) = 6.37$, $p = .003$, and no interaction of context by reward $F(2, 98) = .68$, $p = .51$. Participants in the autonomy-supportive conditions felt significantly more

competent ($M = 1.9$, $SD = .86$) doing the FTD puzzles than those in the coercively-controlled context ($M = 1.4$, $SD = 1.12$). For rewarded participants, the Dunnett T3 test (for unequal sample size) indicated that the reward for meeting a performance standard group ($M = 2.10$, $SD = .66$) significantly differed from the group rewarded for "doing" or spending time on the puzzles ($MD = 1.57$, $SD = .99$) and the group that did not receive a reward ($MD = 1.28$, $SD = 1.18$) groups. In sum, there is a linear relationship between reward level and competence; the more specific the contingency in terms of meeting a criterion, the greater were participants' feelings of competency, but the effect of reward did not depend on context (no interaction).

Performance for the Work Phase

In terms of the number of differences found, a 2 x 3 ANOVA revealed a significant main effect of context, $F(1, 98) = 51.51$, $p < .001$, no main effect of reward, $F(1, 98) = .86$, $p = .43$ and a significant interaction of context by reward, $F(1,98) = 4.83$, $p = .01$. Participants in the coercively-controlled context found significantly more differences than participants in the autonomy-supportive context, ($M = 38.27$, $SD = 9.19$; $M = 27.17$, $SD = 7.15$, respectively). To further clarify the results, the data were analyzed as a 2 X 2 ANOVA with two levels of reward (no reward vs. reward-standard) and two levels of context (controlling vs. autonomous). There was a main effect of context $F(1, 65) = 14.90$, $p = .000$, no main effect of reward $F(1, 65) = 1.50$, $p = .23$ nor an interaction effect of context by reward $F(1, 65) = .64$, $p = .43$. Performance during the treatment phase was greatest for those who worked in the coercively-controlled context ($M = 36.6$, $SD = 9.4$) compared to participants who worked in an autonomy-supportive context ($M = 28.9$, $SD = 7.5$).

A 2 x 3 ANOVA conducted on the number of puzzles worked on showed a similar main effect of context, $F(1, 98) = 29.08$, $p < .001$, no main effect of reward, $F(1, 98) = .87$, $p = .42$ nor an interaction effect of context by reward, $F(1,98) = .05$, $p = .95$. Participants in the coercively-controlled context worked on significantly more puzzles ($M = 10.88$, $SD = 6.22$) than those in the autonomy-supportive context ($M = 5.96$, $SD = 2.08$). Specifically, the controlling context increased measures of performance during the work phase.

FTD Puzzle Estimate Prior to Test

Prior to the test phase, participants indicated how many differences they expected to find during the 3-minute period; overall, participants expected to find 15.3 differences ($SD = 8.18$). The 2 x 3 ANOVA revealed no main effect of context, $F(1, 98) = .19$, $p = .41$, no main effect of reward, $F(2, 98) = 1.74$, $p = .18$, and no interaction effect of context by reward, $F(2, 98) = .90$, $p = .41$. In other words, there were no differences by experimental conditions in terms of expected performance on the test.

Test Performance

ANOVAs (2 x 3) were conducted on the number of differences found and the number of puzzles worked on for the test. In terms of the number of differences found, there was no main effect of context, $F(2, 98) = 1.04$, $p = .31$, no main effect of reward, $F(2, 98) = 1.49$, $p = .23$, and no interaction of context by reward, $F(2, 98) = .38$, $p = .69$. The test for number of puzzles worked on revealed no main effects of context, $F(2, 98) = .90$, $p = .35$, no main effect of reward, $F(2, 98) = 1.43$, $p = .24$, and no interaction of context by reward, $F(2, 98) = .27$, $p = .77$. Generally for the 3-minute test, there were no

significant differences in performance by experimental conditions; participants found on average 15.3 differences ($SD = 5.65$).

Monetary Reward Ratings

Participants in reward conditions rated the monetary incentive in terms of enjoyment, control, interest, pressure, feedback, distraction, and motivation on 7-point Likert scales. One-sample t-tests were conducted comparing the observed means against a hypothesized value of 4, the neutral value on the 7-point scale. For each test, the level of significance was set to .008 using a Bonferroni correction (Shaffer, 1995), since there were 8 items tested.

Rewarded participants did not feel controlled $t(68) = -5.04$, ($M = 2.86$, $SD = 1.89$); pressured $t(68) = -5.72$, ($M = 2.67$, $SD = 1.94$); or distracted by the money $t(68) = -2.29$, ($M = 1.97$, $SD = 1.37$), all p's $< .001$. Participants also reported that the money did not provide them with feedback to evaluate their performance $t(68) = -5.51$, ($M = 2.70$, $SD = 1.97$). The tests showed that participants enjoyed receiving the money $t(68) = 9.75$, $p < .001$, ($M = 5.88$, $SD = 1.61$) but the pay did not motivate them to perform well on the FTD puzzles $t(68) = -1.69$, $p = .10$, *ns*, ($M = 3.58$, $SD = 2.07$) nor did the money increase their interest in FTD puzzles $t(68) = -1.19$, $p = .24$, *ns*, ($M = 3.33$, $SD = 1.97$). On the new item that was added for clarification of the results of Experiment 1, participants reported that the money took away interest in FTD puzzles "not at all" $t(68) = -13.15$, $p < .001$, ($M = 2.01$, $SD = 1.25$).

Discussion

The major findings of Experiment 2 showed that participants spent more time on FTD puzzles and all puzzles available during the free-choice phase after receiving

rewards in an autonomy-supportive setting. In other words, performance contingent rewards allocated in a setting that emphasised freedom of choice not only enhanced free time intrinsic motivation on task (and reduced off task activity) but also free time on related activities (puzzle solving in general). However, the self-report interest measure of intrinsic motivation was not in accord with the behavior measure; even though participants spent more time on the target activity and less on the off-task alternative (reading magazines) participants who received performance based rewards in an autonomy-supportive setting did not report an increase in puzzle solving interest after the free-choice phase of the experiment.

It was expected that rewards provided in the coercively-controlled context also would de-motivate participants, resulting in a decline of intrinsic motivation. However, the findings did not support this prediction. Results showed that participants did not view the context manipulation as excessively coercive. Although participants in the coercively-controlled context reported that the work atmosphere was more restrictive than participants in the autonomy-supportive setting, their ratings did not exceed the midpoint of 4 on the 7-point scale.

The context manipulation produced a number of expected effects. A setting that was free from pressures and limitations caused participants to report stronger feelings of autonomy relative to those who worked in a context designed to be coercive and controlling. Further, context and reward independently altered participants' feelings of competence. In other words, contexts that signaled freedom generated feelings of autonomy and competence; rewards received that were time contingent or tied to a performance standard also produced strong feelings of competence. However, according

to participants, the rewards themselves were not informational; as such, it may be the case that it is the reward contingency based on achieving a time or performance standard that produces competency feelings, and not the reward per se.

The context manipulation also effected performance during the experimental phase. That is, participants who worked in a context that was restrictive and coercive found more differences and worked on more puzzles during the 5-minute experimental phase compared to participants who worked in an autonomy-supportive environment. Generally, coercive settings produce high performance while destroying feelings associated with freedom and ability.

The reward manipulation produced positive effects on participants' perceptions of self-determination. Across reward conditions, participants perceived their behavior as emanating from the self (agency); in other words, they had a sense of volition and control over their behavior with regard to puzzle solving. However, rewards did not cause participants to attribute their behavior to external sources of control; only those participants rewarded in an autonomy-supportive context attributed their behavior less to external pressures; unexpectedly, participants who worked in an autonomy-supportive context did not attribute their actions as deriving from within.

The 3-minute test and performance expectations for the test showed no significant findings. This is the first study of rewards and intrinsic motivation that incorporated a test following the behavioral and interest measures of intrinsic motivation. Several factors could have caused the failure to detect differences. One explanation is that the timing of the test followed the free-choice phase. As such, the experimental manipulations were no longer in effect, and therefore may not have had any influence on test performance. It

could also be the case the spending time on the puzzles during the free-choice phase altered any performance differences that would have been detected. Unfortunately, this possibility cannot be tested with this data since it was not possible to obtain a performance measure during the free-choice phase.

In sum, rewards delivered in an autonomy-supportive context increased intrinsic motivation during a period when rewards were no longer forth coming. Contexts that signaled freedom produced strong feelings of autonomy and competence while rewards caused participants to perceive the target behavior (working on puzzles) as under their own volition and control while also increasing feelings of ability. These findings, generally, do not support CET; a behavioral interpretation can better account for the results. However, there was no decline in intrinsic motivation for participants rewarded in a coercively-controlled context as hypothesised, a finding problematic for both CET and behavioral theory. A theoretical analysis of the findings and the practical implications of the results will be explored in the general discussion (chapter 4).

Figure 3.1. Time spent on FTD puzzles during the free-choice phase according to reward (no reward and reward standard) and context (autonomy-supportive and coercively-controlled) factors.

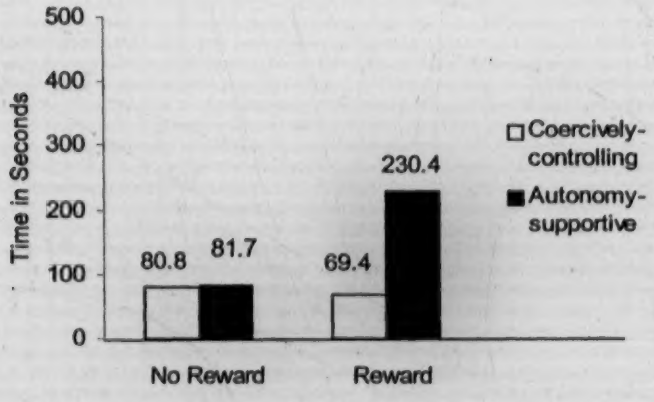
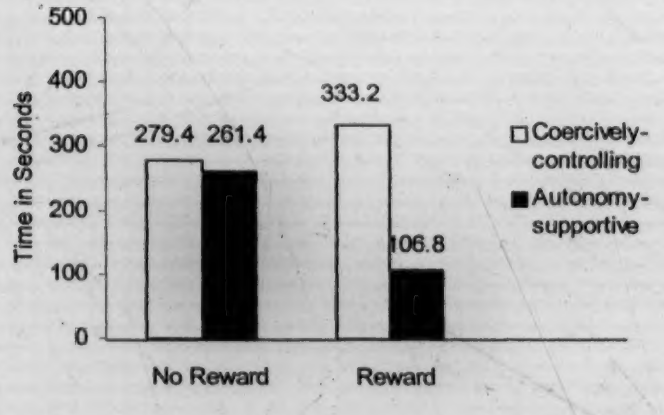


Figure 3.2. Time spent on all available puzzles according to reward (no reward and reward standard) and context (autonomy-supportive and coercively-controlled) factors.

Figure 3.3. Time spent on alternative behavior according to reward (no reward and reward standard) and context (autonomy-supportive and coercively-controlled) factors.



Chapter 4

General Discussion

The results from two experiments indicated that participants rewarded for puzzle solving in an autonomy-supportive context increased free-choice intrinsic motivation for the target activity and resulted in less time on off-task behavior compared with non-rewarded participants. Rewarded participants also perceived their behavior as more self-determined than those who did not receive rewards. Furthermore, participants who worked in an autonomy-supportive context reported greater feelings of autonomy and competence compared to participants who worked in a setting that signaled coercive control. Generally, reward contingencies embedded in a context emphasizing choice, self-initiation, low surveillance, and no deadlines enhanced intrinsic motivation, augmented feelings of autonomy and competence, and increased perceptions of self-determination.

Consideration of the Findings and Theoretical Implications

Free-choice intrinsic motivation increased as a function of reward and social context. Participants who received rewards and worked in a setting that signalled freedom spent more time solving puzzles when rewards were no longer available. These results are contrary to predictions from CET as intrinsic motivation increased when engagement contingent (rewards for doing) or performance based rewards were given in an autonomy-supportive environment.

The findings for engagement contingent rewards on free-time (Experiment 1) are in accord with Brennan and Glover (1980) who inadvertently established an autonomy-supportive context. In their research, participants offered engagement contingent rewards

spent more free time solving puzzles compared to non-rewarded controls. For the work phase, the experimenter left participants alone in the room, creating a setting low on surveillance by an authority. Thus, engagement contingent rewards offered in setting that signalled freedom enhanced intrinsic motivation.

In the CET view, rewards that convey information about competence or ability offset the negative effects of the controlling rewards, but the net effect is either no difference or decreased intrinsic motivation. The results of the Experiment 2, however, showed that performance based rewards given in an autonomy-supportive environment increased intrinsic motivation more than in any other experimental condition. This finding is supported by the research of Pierce et al. (2003). In the Pierce et al. (2003) study, participants rewarded for meeting a progressively challenging performance standard spent more time on the task in a free-choice setting relative to other experimental conditions. Importantly, the researchers inadvertently produced a context in which participants worked free from time deadlines and was low on surveillance by an authority (autonomy-supportive). Again, intrinsic motivation increased under these conditions. Together previous research and the current study indicate that signs of freedom in the work setting alter the motivational effects of reward, resulting in greater intrinsic motivation.

A behavioral view points to the motivational context as a moderator of reward contingencies (Laraway, et al., 2003; McPherson & Osborne, 1988; Michael, 1982; 2000). Based on a history of social conditioning, situations that signal freedom can establish rewards as positive reinforcement and activate the reinforced behavior. These effects are observed in the present studies (Experiment 1 and 2) as increased intrinsic

motivation for puzzle solving. On the other hand, environments that signal coercive control and restrictions on freedom were expected to establish the reward contingency as punishing, resulting in a decline in measures of intrinsic motivation. The results for the context by reward interaction of Experiment 2 supported the expected decline of free-choice intrinsic motivation when rewards were given in a coercive environment. However, compared with non-rewarded controls, the results of both experiments did not show a significant decrease in free-choice intrinsic motivation for the coercively-controlled reward condition. This finding is contrary to both the behavioral and CET predictions and may reflect weak manipulation of the context or setting, discussed in a subsequent section.

Across two experiments, rewards produced positive effects on participants' perceptions of self-determination. Self-determination was assessed by asking participants to rate the degree to which they perceived their behavior to be under their own control (freely chosen) rather than externally forced. Both studies demonstrated that participants rewarded for puzzle-solving perceived their behavior as more self-determined compared to non-rewarded groups. This finding is in accord with two experiments by Overskeid and Svartdal (1996) who found that participants offered a choice to work on puzzles and were rewarded for doing so perceived their behavior as more self-determined than non-rewarded participants. The findings of the present study also support Eisenberger et al. (1999) who found that performance-based rewards increased participants' perceptions of choice to do the task. Each of these studies provides evidence inconsistent with CET claims that engagement contingent and especially performance contingent rewards undermine self-determination. Rather participants who received engagement and

performance contingent rewards (compared to non-rewarded participants) seem to infer that they have control over the offered rewards by choosing to do or not to do the task.

Both experiments demonstrated that autonomy-supportive contexts positively impact peoples' feelings of autonomy, competence, and attributions of performance. Participants who worked on FTD puzzles in a context that emphasized choice and self-initiation showed stronger feelings of autonomy and felt more capable at the task compared to those who worked in a coercively-controlled setting. Alternatively, participants who worked in a highly restrictive context felt more pressure/tension and felt less capable at solving puzzles, a result partially in agreement with Ryan et al. (1983). These researchers found that participants in controlling conditions gave higher ratings of pressure/tension than participants in informational conditions.

According to CET, when people receive rewards for engaging in chosen activities, the offer of reward reduces people's feelings of autonomy and shifts the locus of causality from internal to external reasons for action (deCharms, 1968). Thus, rewards shift attributions toward external control undermining intrinsic motivation (Deci, 1972b). In the present study, participants in an autonomy-supportive setting attributed their performance less to external pressures compared to those in the coercively-controlled context, a finding not in accord with a CET view. A literature review of the studies on attribution, rewards and intrinsic motivation revealed that no studies have empirically demonstrated that rewards shift locus of causality in the way suggested by CET. The findings from the present study suggest that the social context may play a role in the causal attribution of behavior; but the nature of that role cannot be determined from these results.

In both experiments, participants' perceptions of autonomy and attributions of performance were reduced in the coercively-controlled context. One possibility is that these context effects have previously been assigned to reward contingencies. That is, CET researchers have mistakenly assigned the undermining of intrinsic motivation to offered rewards rather than the controlling contexts.

In fact, CET may require adjustment to assumptions about the inherent controlling aspect of rewards, especially extrinsic monetary rewards. Participants' ratings of the money for puzzle solving contradict the "reward equals control assumption." Participants in reward conditions indicated that the money did not make them feel controlled or pressured, nor did it distract them from the task. Participants also enjoyed receiving the money, which would be unlikely if the rewards activated perceptions of control. The dependence of rewards on context may be an alternative to the claim of CET that rewards inherently lead to evaluations of pressure, anxiety and control.

Across the two experiments, participants in a coercively-controlled setting performed at a higher level (worked on more puzzles and found more solutions) than those who worked in a setting that signalled freedom. Thus, surveillance by authority and strict time deadlines keep people on task and productive. Once the authority and deadlines were removed, however, participants did not show intrinsic motivation to continue the activity. Recall that participants in coercively-controlled settings felt less autonomous and competent compared to those who worked in an environment that signalled freedom. Generally, coercively-controlled contexts elevate performance at the expense of peoples' feelings of autonomy, assessment of ability and intrinsic motivation.

Methodological Issues

One concern with the experiments is a lack of replication of Experiment 1 by the same conditions in Experiment 2. Several meta-analytic reviews of the experimental studies on rewards and intrinsic motivation have shown that rewards produce positive, negative, or no effects on intrinsic motivation (Cameron, et al., 2001; Cameron & Pierce, 1994; Deci, et al., 1999a; Eisenberger & Cameron, 1996; Eisenberger, et al., 1999). For all the meta-analyses to date, a negative effect has been found for tangible rewards offered for simply doing a task (engagement contingent), without regard to any level of performance. Although the overall effect of this reward contingency on intrinsic motivation is negative, a closer examination of the studies shows varying results. Some studies demonstrate negative effects on intrinsic motivation (e.g., Feehan & Enzle, 1991; Pretty & Seligman, 1984), some experiments show no effects (e.g., Amabile, Henessey & Grossman, 1986, Experiment 1; Tripathi, 1991), while others even report positive effects (Brennan & Glover, 1980; Deci, 1972a). Based on Cameron et al (2001), 17 of 54 studies (32%) of studies did not produce the negative effect of rewards on intrinsic motivation with engagement contingent rewards. This suggests that about 1 in 3 studies will fail to detect a negative effect when rewards are given simply for doing the experimental activity.

Another concern is that Experiment 2 did not reveal a difference by condition in the interest measure of intrinsic motivation, perhaps reflecting the reliability and validity of this measure. Deci et al. (1999) compared the interest and free-choice behavior measures for demand characteristics and carry over effects from the extrinsic reward phase and stated, "we believe that free-choice behavior is a more valid measure of

intrinsic motivation [than the interest measure] and thus that the set of findings for the free-choice measure is the more accurate indicator of the actual effects of reward on intrinsic motivation" (p. 655). Thus, based on assessed validity, failure to detect differences in free-choice interest would not invalidate intrinsic motivation results measured as free-time on puzzles. That is, the present study provides a strong test of the effects of reward and context on intrinsic motivation.

An additional methodological issue concerns the context manipulation. Although participants in the coercively-controlled setting indicated the work atmosphere was significantly more restrictive than those in the autonomy-supportive setting, their ratings of the work atmosphere did not exceed the midpoint of the scale. Both studies incorporated multiple procedures to establish a coercive setting (surveillance by an authority, deadlines, lack of choice and self-initiation), however, it may be that the experimental setting by its very nature is controlling and little more can be done to produce an atmosphere that exceeds it in terms of control (Orne, 1962).

On the other hand, reviews of the literature have shown negative effects of rewards on intrinsic motivation (see Harackiewicz, 1979; Swann & Pittman, 1977), indicating that it is possible to establish suppressive effects of rewards on intrinsic motivation in the laboratory. One possibility is that another condition must also be present to insure consistent negative effects. Recent work by Gear (2007) indicates that task difficulty is an important moderator but how this condition affected the present results is unclear. Another possibility is that the context manipulation produced the requisite differences but the within group variance was too large for the comparison of free-time between the coercively-controlled reward and coercively-controlled no reward

groups. Procedures to reduce error variance such as more consistency in the presentation of context may be necessary to obtain reliable differences.

Practical Considerations: Freedom and the Workplace

Overall, the findings across two experiments indicate that rewards can be used to enhance peoples' intrinsic motivation when delivered in an autonomy-supportive context. The work environment is one context that is extremely important for effective performance. In a coercive and controlling setting (authoritarian) with time deadlines, threats, and performance evaluations, people would respond to performance-based rewards as more coercive control. In this case, the employees would be unmotivated and their job performance would be suppressed by the reward contingency; they also may experience pressure to act in ways the boss wants and feel controlled by the boss's reward system (non-autonomous). In a coercively-controlled context, the offer of rewards would be expected to reduce intrinsic motivation for job-related work (job satisfaction). Thus, when opportunities arise to engage in job-related activities that are not required, the employees should choose not to do them. In contrast, rewards embedded in a context that signals freedom is one way to increase employee's interest in their work. Specifically, work settings can be arranged to allow for employees to experience feelings of autonomy and perceptions of self-determination. Employees, who can choose when and how they will tackle the work, carry out assignments without external pressures and constraints as in the case of the micro-managing superior, and are rewarded for meeting work requirements/standards, are likely to experience high intrinsic motivation and satisfaction with their jobs. At the same time, these employees should perceive themselves as self-determined and feel competent in their ability to perform their designated responsibilities.

Essentially, in terms of Western cultures, these experiments show that contexts and rewards together can enhance people's motivation to perform work related activities even in off hours when there is no requirements to continue.

We can think about freedom and the workplace in two ways: freedom from something and freedom to something. Freedom sometimes involves freedom from aversive control; all living things act to escape from ongoing aversive stimulation and some learn to make responses to avoid aversive control altogether (Skinner, 1971, p. 24). We reflexively pull our hand away from a hot stove, or use our hands to shield our ears from loud noises; we learn to stay off of thin ice on a river or take a different route to avoid a bully. These behaviors that serve defensive or survival functions are based on a biological propensity that evolved because of its survival value. Genetic tendencies for freedom from coercion likely extend across cultures, time and places. In the workplace, time deadlines and excessive surveillance create stressful situations and are implicated in health related problems (ulcers, sleep problems, and generalized anxiety). Policies that remove coercive control by authorities and reduce stress would be expected to enhance employees' perceived freedom and intrinsic motivation regardless of sociocultural variation.

Freedom and autonomy also relate to freedom to act or self-determination (Ryan & Deci, 2002). Autonomy involves choosing among options as well as low feelings of pressure-tension (Houlfort et al., 2002). Cross-cultural research by Markus & Kitayama (1991) on intrinsic motivation and autonomy has shown differences between participants who view the self as independent (Western cultures) and those who view the self as interdependent (Eastern cultures). The value of freedom to act or choose seems to depend

on the culture in which one is reared. People in Western cultures value and support freedom of action whereas people from Eastern cultures do not emphasize it. People from Western cultures, would evidence greater intrinsic motivation for their jobs when freedom of action is propagated in the workplace (choosing when and what tasks to do over time). This may not be the case for employees of interdependent cultures in which freedom to chose is not highly valued. The democratic work place and its positive effects on satisfaction and productivity may be limited to cultures that uphold the ethos of freedom of choice and individual self-determination.

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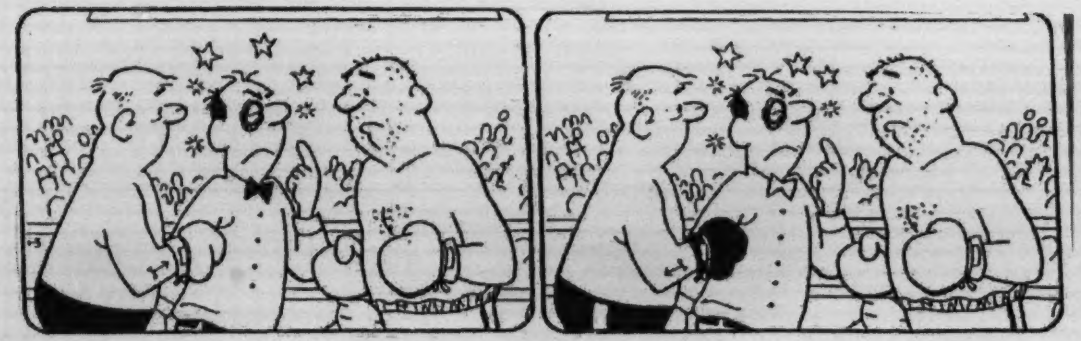
Appendix A

This is a sample of a find-the-difference puzzle.



Sample of other puzzles available for participants to work on during the free-choice phase.

PICTURE PUZZLES

S Is for Saturday

How many things can you find in this scene that begin with the letter S? Spotting at least 30 is skillful; 35 or more is sensational.

Appendix B

Below are the questionnaires designed to assess initial interest in solving find-the-difference puzzles and solving puzzles in general prior to the experimental manipulations.

Place an X on the line that best represents your position.

I think the find the difference puzzles are:

interesting	___	___	___	___	___	___	___	boring
dull	___	___	___	___	___	___	___	exciting
enjoyable	___	___	___	___	___	___	___	unpleasant
tedious	___	___	___	___	___	___	___	entertaining

In general, I find puzzle solving:

interesting	___	___	___	___	___	___	___	boring
dull	___	___	___	___	___	___	___	exciting
enjoyable	___	___	___	___	___	___	___	unpleasant
tedious	___	___	___	___	___	___	___	entertaining

Below is the manipulation check to assess the work atmosphere during the treatment phase.

Please circle the number below each statement that best represents your position.

In terms of the atmosphere during my work on puzzle solving, I felt:

Encouraged to take the initiative

1	2	3	4	5	6	7
strongly disagree						strongly agree

In control of the situation

1	2	3	4	5	6	7
strongly disagree						strongly agree

I had no freedom of choice

1	2	3	4	5	6	7
strongly disagree						strongly agree

I had the opportunity for self-direction

1	2	3	4	5	6	7
strongly disagree						strongly agree

That there were a lot of restrictions

1	2	3	4	5	6	7
strongly disagree						strongly agree

That there were many demands made on me

1	2	3	4	5	6	7
strongly disagree						strongly agree

Confined by the situation

1	2	3	4	5	6	7
strongly disagree						strongly agree

Below are the items measuring autonomy and competence.

Autonomy Measure

Place an X on the line that best represents your position.

In terms of solving find-the-difference puzzles, I feel:

tension	___	___	___	___	___	___	___	comfortable
constrained	___	___	___	___	___	___	___	free
nervous	___	___	___	___	___	___	___	relaxed
anxious	___	___	___	___	___	___	___	calm
at ease	___	___	___	___	___	___	___	stressed
pressure	___	___	___	___	___	___	___	self-controlled

Competence Measure

Place an X on the line that best represents your position.

In terms of solving find-the-difference puzzles, I feel:

capable	___	___	___	___	___	___	___	unable
incompetent	___	___	___	___	___	___	___	competent
confident	___	___	___	___	___	___	___	unsure

The items below assess self-determination and attribution for performance.

Please circle the response for each statement using the following scale

1	2	3	4	5	6	7
strongly disagree						strongly agree

I worked on the puzzles:

Because I chose to	1	2	3	4	5	6	7
For my own fulfillment	1	2	3	4	5	6	7
Because I felt I had to	1	2	3	4	5	6	7
For my own personal satisfaction	1	2	3	4	5	6	7
Because I wanted to	1	2	3	4	5	6	7

My performance on the find the difference puzzles was due to:

Time pressure	1	2	3	4	5	6	7
Wanting to please the researcher	1	2	3	4	5	6	7
My interest	1	2	3	4	5	6	7
My skill	1	2	3	4	5	6	7
My effort	1	2	3	4	5	6	7
Pressure from the situation	1	2	3	4	5	6	7

Below are the questionnaires that assess free-choice interest in solving find-the-difference puzzles and solving puzzles in general following the 10-minute free-choice phase.

Place an X on the line that best represents your position.

I find the find-the-difference puzzles to be:

interesting	___	___	___	___	___	___	___	boring
dull	___	___	___	___	___	___	___	exciting
enjoyable	___	___	___	___	___	___	___	unpleasant
tedious	___	___	___	___	___	___	___	entertaining

Place an X on the line that best represents your position.

In general, I find solving puzzles to be:

interesting	___	___	___	___	___	___	___	boring
dull	___	___	___	___	___	___	___	exciting
enjoyable	___	___	___	___	___	___	___	unpleasant
tedious	___	___	___	___	___	___	___	entertaining

These items assess participants' perceptions of the reward for Experiment 1.

Please circle a response for each of the statements below:

I enjoyed receiving the money.

1 2 3 4 5 6 7
not at all very much

I felt controlled by the money.

1 2 3 4 5 6 7
not at all very much

Receiving money made me feel more interested in doing find the difference puzzles.

1 2 3 4 5 6 7
not at all very much

The money made me feel pressured.

1 2 3 4 5 6 7
not at all very much

The money provided me with feedback to evaluate my performance.

1 2 3 4 5 6 7
not at all very much

The money distracted me from the task.

1 2 3 4 5 6 7
not at all very much

The money motivated me to perform well on the find-the-difference puzzles.

1 2 3 4 5 6 7
not at all very much

These items assess participants' perceptions of the reward for Experiment 2.

Please circle a response for each of the statements below:

I enjoyed receiving the money.

1 2 3 4 5 6 7
not at all very much

I felt controlled by the money.

1 2 3 4 5 6 7
not at all very much

Receiving money made me feel more interested in doing find the difference puzzles.

1 2 3 4 5 6 7
not at all very much

The money made me feel pressured.

1 2 3 4 5 6 7
not at all very much

The money provided me with feedback to evaluate my performance.

1 2 3 4 5 6 7
not at all very much

The money distracted me from the task.

1 2 3 4 5 6 7
not at all very much

The money motivated me to perform well on the find-the-difference puzzles.

1 2 3 4 5 6 7
not at all very much

Receiving money made me feel less interested in doing find the difference puzzles.

1 2 3 4 5 6 7
not at all very much

Below are the two open-ended questions to determine participants' level of suspicion.

During the experiment, did you form any specific ideas about the purpose of this study?

How did your ideas about the purpose of the study affect your performance?

Appendix C

Script for Experiment 1

Hi, are you here for the study? Please have a seat for a minute and I'll be right back. (*Go start the timer on the video camera and record/play on the VCR*). Could you come with me? Leave your stuff on the chair, including your watch and any electronics that you have, like a cell phone or pager. Come with me into this lab. You can take a seat there (*point to the chair at the table*).

(*Give the participant the informed consent sheet and say*) Before we begin, could you read this consent form, and if you agree to participate, then sign it.

This is a study about puzzle solving and behavior. You will work on a recognition task that we call the "find-the-difference" puzzle. Here is an example of the puzzles. (*show the person the sample*).

There are two pictures here with 6 differences between them. For example, in the top picture there is baby that is crying, but in the bottom picture he is smiling. Use a red marker to circle the items in the bottom picture that are different from the top picture. Now, circle the baby in the bottom picture that is not crying. Now, find and circle 2 more differences. Do you understand what you are to do? Could you repeat to me what you are suppose to do so that I be sure that you understand? (*after the participant confirms the instructions say*) That's right. Now, before I give you the puzzles, I'd like you to complete this questionnaire (*give the participant the initial interest questionnaire and go sit at the table in corner so that s/he is not apprehensive about answering the questions*) and let me know when you're done.

(*For both autonomous context conditions, while the participant works on the puzzles, the experimenter will move to another table in the lab engaged in her own work*).

Autonomous context: Would you like to start working on the puzzles? Here are the puzzles (*hand the participant the puzzles*). You can begin whenever you like, turn over the puzzles when you are ready to begin (experimenter starts timer).

Autonomous reward context: Would you like to start working on the puzzles? Here are the puzzles (*hand the participant the puzzles*). One other point, I have money to pay people in this study (*place the ten dollar bill on the table in front of the participant*). You'll get $10.00 for working on the puzzles regardless of how many puzzles you work on or how many differences you find. In other words, after you work on any or all of the puzzles, you'll get $10.00 for finding differences. You can begin whenever you like, turn over the puzzles when you are ready to begin (experimenter starts timer).

(*For both controlling context conditions, the experimenter will stand beside the participant, holding the timer and stopwatch, and look at the work the participant is doing*)

Controlling context: (*grab the time and clipboard and stand facing the participant*) Okay. (*hand him/her the puzzles saying*) Here are the puzzles that you are required to do for this experiment. There is a strict time deadline of 5 minutes. I will tell you when you can begin the puzzle solving and then I'll let you know once the 5-minute time period has ended. I'll also tell you each minute that you have left. Turn over the pictures and start. 4 minutes left…3 minutes left…etc. Time is up.

Possible prompt. (*if a participant asks if it is necessary for the experimenter to stand close to him/her while s/he does the puzzles, one prompt will be used*: **"it is necessary for me to observe you"**).

Controlling reward context. (*grab the time and clipboard and stand facing the participant*) Okay. (*hand him/her the puzzles saying*) Here are the puzzles that you are required to do for this experiment. There is a strict time deadline of 5 minutes. I will tell you when you can begin the puzzle solving and then I'll let you know once the 5-minute time period has ended. I'll also tell you each minute that you have left. One other point, I have money to pay people in this study (*place the ten dollar bill on the table in front of the participant*). You'll get $10.00 for working on the puzzles for 5 minutes regardless of how many puzzles you work on and how many differences you find. In other words, after you work on any or all of the puzzles for 5 minutes, you'll get $10.00 for finding differences. Turn over the pictures and start. 4 minutes left…3 minutes left…Time is up.

Pay reward participants: Now that you have worked on the puzzles, here is your money to keep *(hand the person the money)*.

Now I would like you to complete this questionnaire. (*give him/her the manip- check, autonomy, self-determination, and competence package. If the person is in a reward condition s/he will receive a packet with the above questionnaires as well as the money questionnaire. Leave the room while the participant completes the packet*). I'm going to check on another participant. Just give me a holler when you're done. (*leave the door open when you exit. Just before the person has finished, make a loud knocking sound on the anteroom door where you first greet the participants and say)* hi, are you here for the study, ok, just take a seat and I'll be with you in a minute.

Free-choice Phase. *(*Collect the questionnaire and say*) We have a few things left to do, but someone else has arrived for the study. I'm going to take a few minutes to get the next person set up before we continue, so I've grabbed some things you may do while I'm gone (*depending on the randomized order*) here are some magazines, some other puzzles, and some find-the-difference puzzles. You can do whatever you like, but please don't leave the room until I get back. OK? (*Leave the room and start recording...wait 10

minutes. Record the performance data for the work phase. After 10 min. return and say*) thanks for waiting. Could you complete this questionnaire and again, let me know when you're finished (*give the participant the task interest and suspiciousness questionnaires*)?*

Script for Experiment 2

Hi, are you here for the study? Please have a seat for a minute and I'll be right back. (*Go start the timer on the video camera and record/play on the VCR*). Could you come with me? Leave your stuff on the chair, including your watch and any electronics that you have, like a cell phone or pager. Come with me into this lab. You can take a seat there (*point to the chair at the table*).

(*Give the participant the informed consent sheet and say*) Before we begin, could you read this consent form, and if you agree to participate, please sign it.This is a study about puzzle solving and behavior. You will work on a recognition task that we call the "find-the-difference" puzzle. Here is an example of the puzzles. (*show the person the sample*).

There are two pictures here with 6 differences between them. For example, in the top picture there is baby that is crying, but in the bottom picture he is smiling. Use a red marker to circle the items in the bottom picture that are different from the top picture. Now, circle the baby in the bottom picture that is not crying. Now, find and circle 2 more differences. Do you understand what you are to do? Could you repeat to me what you are supposed to do so that I am sure that you understand? (*after the participant confirms the instructions say*) That's right. Now, before you get the puzzles, would you complete this questionnaire (*give the participant the initial interest questionnaire and go sit at the table in corner so that s/he is not apprehensive about answering the questions*) and let me know when you're done.

(*For both autonomous context conditions, while the participant works on the puzzles, the experimenter will move to another table in the lab engaged in her own work*).

Autonomous context: Would you like to start working on the puzzles? Here are the puzzles (*hand the participant the puzzles*). You can begin whenever you like, turn over the puzzles when you are ready to begin (experimenter starts timer).

Autonomous context with reward: Would you like to start working on the puzzles? Here are the puzzles (*hand the participant the puzzles*). One other point, there is money to pay people in this study (*place the ten dollar bill on the table in front of the participant*). You'll get $10.00 for working on the puzzles regardless of how many puzzles you work on or how many differences you find. In other words, after you work on any or all of the puzzles, you'll get $10.00 for finding differences. You can begin whenever you like, turn over the puzzles when you are ready to begin (experimenter starts timer).

Autonomous context with reward for meeting a performance standard: Would you like to start working on the puzzles? Here are the puzzles (*hand the participant the puzzles*). One other point, there is money to pay people in this study (*place the ten dollar bill on the table in front of the participant*). You'll get $10.00 for finding at least 20 differences. In other words, after you find at least 20 differences by working on any or all of the puzzles, you'll get $10.00. You can begin whenever you like, turn over the puzzles when you are ready to begin (experimenter starts timer).

(*For both controlling context conditions, the experimenter will stand beside the participant, holding the timer and stopwatch, and look at the work the participant is doing*)

Controlling context: (*grab the timer and clipboard and stand facing the participant*) Okay. (*hand him/her the puzzles saying*) Here are the puzzles that you are required to do for this experiment. There is a strict time deadline of 5 minutes. I will tell you when you can begin the puzzle solving and then I'll let you know once the 5-minute time period has ended. I'll also tell you each minute that you have left. Turn over the pictures and start. 4 minutes left…3 minutes left…etc. Time is up.

Possible prompt. (*if a participant asks if it is necessary for the experimenter to stand close to him/her while s/he does the puzzles, one prompt will be used*: "it is necessary for the experiment that I closely observe your performance")

Controlling context with reward. (*grab the time and clipboard and stand facing the participant*) Okay. (*hand him/her the puzzles saying*) Here are the puzzles that you are required to do for this experiment. There is a strict time deadline of 5 minutes. I will tell you when you can begin the puzzle solving and then I'll let you know once the 5-minute time period has ended. I'll also tell you each minute that you have left. One other point, there is money to pay people in this study (*place the ten dollar bill on the table in front of the participant*). You'll get $10.00 for working on the puzzles for 5 minutes regardless of how many puzzles you work on and how many differences you find. In other words, after you work on any or all of the puzzles for 5 minutes, you'll get $10.00 for finding differences. Turn over the pictures and start. 4 minutes left…3 minutes left…Time is up.

Controlling context and reward for meeting the performance standard. (*grab the time and clipboard and stand facing the participant*) Okay. (*hand him/her the puzzles saying*) Here are the puzzles that you are required to do for this experiment. There is a strict time deadline of 5 minutes. I will tell you when you can begin the puzzle solving and then I'll let you know once the 5-minute time period has ended. I'll also tell you each minute that you have left. One other point, there is money to pay people in this study (*place the ten dollar bill on the table in front of the participant*).You'll get $10.00 for finding at least 20 differences. In other words, after you find at least 20 differences by working on any or all of the puzzles, you'll get $10.00.

Pay reward participants: Now that you have worked on the puzzles, here is your money to keep *(hand the person the money)*.

Now, please complete this questionnaire. (*give him/her the manip- check, autonomy, self-determination, and competence package. If the person is in a reward condition s/he will receive a packet with the above questionnaires as well as the money questionnaire. Leave the room while the participant completes the packet*). I'm going to check on the arrival of another participant. Just give me a holler when you're done. (*leave the door open when you exit. Just before the person has finished, make a loud knocking sound on the anteroom door where you first greet the participants and say)* hi, are you here for the study, ok, just take a seat and I'll be with you in a minute.

Free-choice Phase. (Collect the questionnaire and say) We have a few things left to do, but someone else has arrived for the study. I'm going to take a few minutes to get the next person set up before we continue, so I've grabbed some things you may do while I'm gone here are some magazines, some other puzzles, and some new find-the-difference puzzles. You can do whatever you like, but please don't leave the room until I get back. OK? (Leave the room and start

recording…wait 10 minutes. Record the performance data for the work phase. After 10 min. return and say) thanks for waiting. Please complete this questionnaire and again, let me know when you're finished (give the participant the task interest questionnaire).

Test Phase.

Now you are ready for a 3 minute assessment of your performance on FTD puzzles. For the assessment, you must find at least 5 differences on a puzzle before you move to the next puzzle. That is, you are not to move on to the next puzzle until you have found 5 differences. Do you understand? Before we start the assessment, could you answer this question?

Are you ready? Begin. Time is up. (gather the test materials to score). Please complete this brief questionnaire and again, let me know when you're finished (give the participant the suspiciousness check questionnaire).

Oral Debriefing for Experiment 1 and 2

(grab $10 for the no reward participants, the money received form and nondisclosure form).

Ok, now that we're done, I'm going to explain what the study was about. If you have any questions, feel free to ask.

In this study, I was interested in how external constraints affect peoples' perceptions of freedom and choice, and how those things affect task performance and liking for the task. Some of the people in this study are offered money to work on the puzzles and some are not. So, to be fair, we are paying everyone the same amount of money for being in this study. (*if the person is in one of the two groups that were not rewarded, give them the $10)* Could you please sign this form to show that you got the money?

This is how I went about examining the issue. We brought you in here, and you and all the other participants worked on the same task that required you to circle differences between two pictures. Half of the participants were offered money for finding differences, and half were not. This was one of the independent variables in the study. It is called an independent variable because it is something we changed among the participants. Another of our independent variables was the context in which you worked on the puzzles. Some of the participants worked in a controlling context, where the experimenter stood over them with a stopwatch, watching while they worked on the puzzles and gave them strict instructions on when to begin and finish the task. Other participants worked in a non-controlling context. The experimenter did not hover over them, and they were allowed to choose when they wanted to begin working on the puzzles.

Near the end of the experiment, I told you that I had to leave to set up the next person in the study and I left you alone for 10 minutes. I wanted to see if you worked on the puzzles once I left the room. That was my dependent variable in the study. Did you realize that is why I left you here? The reason I didn't tell you this is because I wanted to see if people would do the puzzles if they had previously received money for doing them. In order to know if people worked on the puzzles, you were videotaped during the study, there is a camera hidden over there in the corner. You may feel uneasy about having been videotaped, however, remember from the consent form that you have the right to withdraw from the study at anytime without penalty. Before making your decision, I'd like to explain why it was necessary for the camera to be hidden. First of all, when people are concerned over being judged by others, which is often arousing, it may cause anxiety or concerns about self-presentation, which we refer to as evaluation apprehension. If this happens, it could effect the dependant variable. In this case, I won't be able to determine if the independent variable is responsible for producing the change in the dependent variable. Secondly, as I mentioned before, I am manipulating the context in which rewards are offered, controlling versus autonomous. Since surveillance is part of the manipulation of this independent variable, giving it to all conditions may weaken the manipulation. If this happens, I may not be able to detect the effect of the independent

variable on the dependent variable, if there is one. One last point I'd like to make concerning the time you were left alone is that a great deal of time and effort went into constructing a situation that would be credible to everyone. So, you should realize that you were taken in by the effectiveness of the situation and not because of anything about you. So, do you understand why I could not tell you about the videotaping?

You also answered questionnaires that assessed your interest in the task, perceived competence, autonomy, and self-determination, and attitudes toward receiving a reward. I'm sorry I couldn't tell you everything that was going on here, but if people come into a study knowing what is going on, they may act in a way they think I want them to giving me the responses they think I am looking for. We call these demand characteristics. If people come in with expectations about how they should behave, it would ruin our results. I'd like to ask you not to tell anyone anything that happened here today, ***especially*** about the money. Could you sign this form that says you won't tell anyone. If anyone does ask, you could tell them that you got to work on some puzzles. Do you have any questions? Okay, thank you very much for participating. (*hand him/her the written debriefing form).*